

# BBC ACORN

## USER

**WORDWISE PLUS:**  
Strip down your  
programs for speed

**ARC HODGEPODGE:**



See it grow in  
living colour

**ANNUAL REPORT:**  
Big software for  
small businesses

**DIY CASTLES:**  
Design, print, cut  
out and keep

# RAM STAR

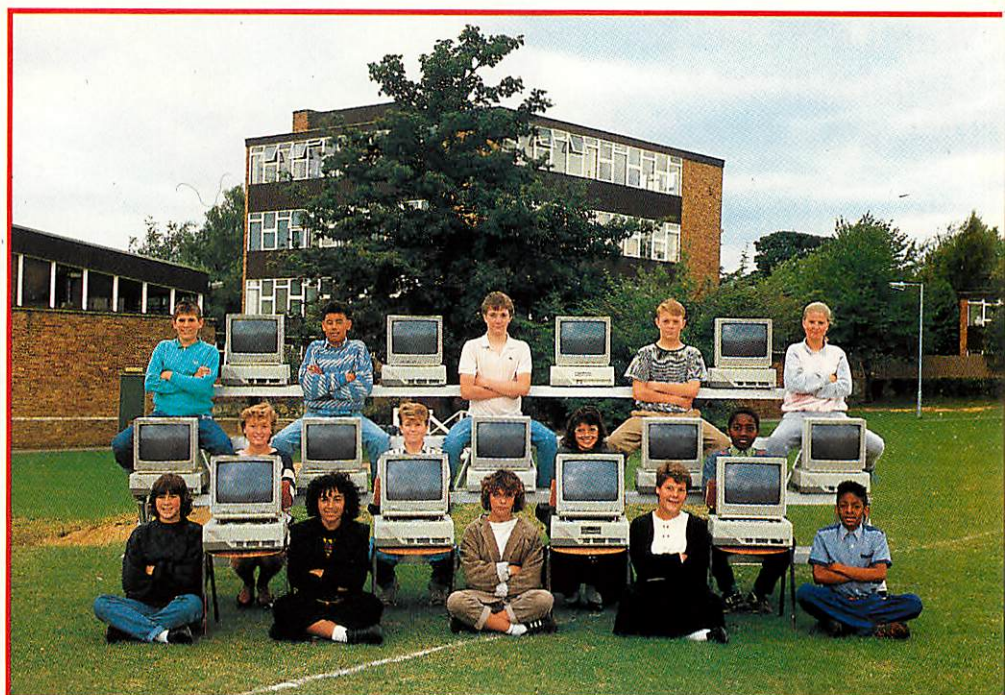
Jukebox tricks  
in sideways RAM

**COMPETITION:**  
Win an Archimedes  
from Watford





# The class of '88



IN 1988 RM BECAME THE TOP

MICROCOMPUTER NETWORK SUPPLIER IN EDUCATION. BY NOW, LITERALLY THOUSANDS OF NIMBUS NETWORKS HAVE BEEN INSTALLED AND SET TO WORK IN SCHOOLS AND COLLEGES ALL OVER THE COUNTRY. HERE ARE SOME EXTRACTS FROM THE END-OF-YEAR REPORT:

**Networking.** RM ARE THE CHAMPIONS, LEADING IN BOTH HARDWARE PERFORMANCE AND SOFTWARE AVAILABILITY. RM'S CONTINUING IMPROVEMENT HAS STOOD THEM IN GOOD STEAD IN OTHER SUBJECTS TOO...

**Control.** WITH AN RM NETWORK, THE TEACHER CAN EASILY ENSURE THAT THE VERY BEST SOFTWARE IS EQUALLY AVAILABLE FROM THE CENTRAL SERVER TO ALL PUPILS — YET STILL ALLOW EACH PUPIL TO PROGRESS AT HIS OR HER OWN SPEED.

**Ease of Use.** THE SOPHISTICATED GRAPHICS THAT COME WITH ALL NIMBUS SYSTEMS MEANS THAT EVERYONE — EVEN THE YOUNGEST — CAN WORK IN A USER-FRIENDLY ENVIRONMENT WITH PULL-DOWN MENUS, ICONS, AND A MOUSE. AND LOTS OF COLOURFUL, SPECIALLY-DESIGNED SOFTWARE.

**Budget.** AN RM NETWORK LETS EVERYONE SHARE HARD DISCS AND PRINTERS, AND GET MAXIMUM USE OUT OF THE INVESTMENT. THEN THERE'S THE SOFTWARE; NOT ONLY IS IT MADE FOR SHARING — EVERY NETWORK INCLUDES A SPECTACULAR LIBRARY OF VALUABLE

SOFTWARE THAT GETS THE SYSTEM OFF TO A FLYING START, GIVING PUPILS A FIRM BASE OF APPLICATIONS PROGRAMS THEY CAN USE IN ALL SUBJECTS.

NO WONDER RM ARE ACCLAIMED BY PUPILS AND TEACHERS ALIKE.

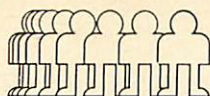
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Acorn DTP - Available April 89	TBA

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Oak Professional PDT	299.00

### COLTON SOFTWARE

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### CLARES SOFTWARE

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Clares AlphaBase	39.00
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U Connect	47.00
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AMX Super Art ROM *	39.00
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\* Master or BBC/B+ Version Available

### CAMBRIDGE Z88 COMPUTER

Z88 Computer	239.00
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Roland DXY1200 Plotter	869.00
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Printer Cable

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# PIPEDREAM

AND VIEW PROFESSIONAL

# PIPEDREAM

POWER AT YOUR FINGERTIPS

## PIPEDREAM

- o The best word processor for the Archimedes. It has dynamic on-screen page breaks, multi-column text and 'live' embedded numbers and calculations.
- o The fastest and most powerful spreadsheet for the Archimedes. It can sort, format text around numbers and store and quickly recalculate large models.
- o The most flexible database for the Archimedes. It can store a huge number of fields, search, sort and select records and have fields which are calculated from other values.
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- o A mail-shot program which can store names and addresses, write the letter to send to them and selectively mail to each one, including calculations.
- o Ideal for writing invoices, statements and estimates: the text and figures can fit easily into a pre-designed form – and, of course, the figures are 'live'.
- o An excellent way to record customer or sales information: keep a database of sales leads, sort it on different criteria, produce the required totals and select and print out the key information.
- o Compatibility with 4 different computers: the BBC Micro, the Acorn Archimedes, the Z88 and the IBM PC.
- o A pull-down menu and help system to make it easy for you to get started.
- o Built-in file transfer with PipeDream on the portable Z88 so that you can continue work away from your main computer.



## SPELLCHECK

- o PipeDream SpellCheck is now available, with a dictionary of 93,003 words and the ability to check over 40,000 words per minute on the Archimedes.

## VIEW PROFESSIONAL

- o The BBC Micro version of PipeDream which provides complete file compatibility with PipeDream and with the Z88 and which shares many of PipeDream's features.

PipeDream costs only £99.00 plus VAT, View Professional £60.00 plus VAT and SpellCheck £43.00 plus VAT.

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# BBC ACORN

## USER

ISSUE NO 80

MARCH 1989

WIN  
£1000 ARCHIMEDES - SEE PAGE 79

### COVER



#### COVER FEATURE

Sideways RAM made easy, pages 66-71

Cover by Andrew MacConville

### EDITORIAL

It is clear that there isn't any 16- or 32-bit micro that meets the needs of education quite as well as the BBC Master.

The various contenders, Arc, Nimbus, Amiga, Macintosh, ST and IBM PCs, all have their strengths and weaknesses, and they've all been tested by the National Council for Educational Technology. Its conclusions are currently held by the Government - depriving teachers of the advice they need about buying new micros.

The NCET is reported to have concluded that emulator software allowing each micro to run existing BBC micro educational software isn't the right approach - yet last year the DES effectively told manufacturers that an emulator was vital.

Most manufacturers have spent vast sums of money developing emulators. Is it possible that the DES is holding up the report because it's embarrassed?

### NEWS

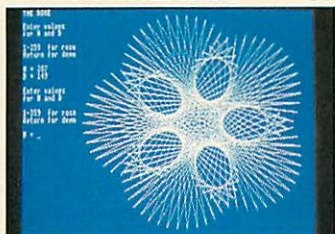
Half price Unix	7
DES sits on NCET report, BBC puts applications first	
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COMMS COLUMN	13
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*Pro-Artisan* from Clares, an interactive video from Virgin, *Labelwriter* from Wight Scientific and a KX119 monochrome monitor from Taxan

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### FEATURES

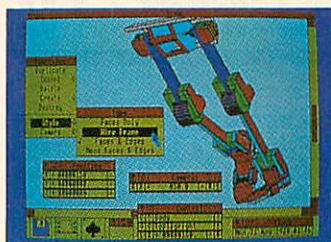
JUKEBOX TUTORS	66
Easier program writing with sideways RAM. Plus David Harper gives you an example for <i>Wordwise Plus</i>	
WORDWISE MINUS	73
Chris Robbins looks at the programming language of <i>Wordwise Plus</i> and shows how to lose space in order to speed it up	
BEST OF LIFE	78
Life could be better! When you see our beautiful Hodgepodge pictures, you too will think so. Andrew Green tells us how	
THE FULL ACCOUNT	81
Roger Carus looks at the business software market and discovers there are few new products	
NAME OF THE ROSE	87



A beautiful Spirograph-like program from Steve MacGuire. Create your own designs

### REVIEWS

GAMES PAGE	121
Sam Greenhill reviews the latest, including a sports package from Superior Software	
DESIGNER CASTLES	89
And now for something completely different! Chris Drage and Nick Evans were impressed with Data Design's latest software for education	
GAMES REVIEWS	123
Superior's <i>A Question of Sport</i> and for the Archimedes <i>Repton 3</i> from Superior Software and <i>Pacmania</i> from Grandslam have been put through their paces	
NUMBERING UP	125
Two packages useful for teaching maths get the thumbs up from Martin Phillips - <i>Numerator</i> from Logotron and <i>Geometrix</i> , the first package from European Educational Software	
GETTING IT WET	129
Dave Fletcher tries his hand at running a water authority	
OUT OF THE SHADOW	130

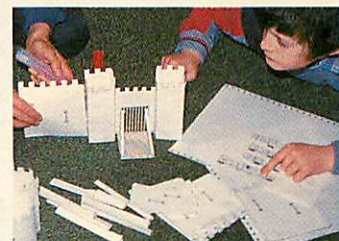


Sam and Richard Greenhill look at Ace Computing's Archimedes solid modeller *Euclid* and describe how it's helping them build a humanoid robot

GOOD CONNECTIONS	133
The Amstrad SM2400 modem appears attractive to Acorn users. But Dr Christopher Dobbins found it quite difficult to actually get started	
FILE THROUGH	137
Dave Lawrence examines <i>Advanced File Manager</i> from Pres and finds that it's good but could be a lot better	

### EDUCATION

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NCET Report withheld	
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Data Design's software is a good introduction to school history, as well as a resource for CDT teaching. And it's great fun at home too

### REGULARS

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David Atherton with a Cut and Paste ROM and some tips for Master 512 users	
ARC AGORA	46
David Acton shows you how you can archive your hard discs. There's also a module for finding path-names	
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READER OFFERS	76,92,134

### NEXT MONTH



*Codename Druid*, a super type-in game, plus more on business, multi-columns in *View*, font software and a little Smalltalk on the Archimedes



Editor Graham Bell. Technical Editor Robert Miller. Editorial Assistant Christina Neal. Sub-Editor Pauline McLernon. Production Assistant Sally-Ann Sweeney. Art Director Ian Findlay. Art Editor Paul Holmes. Art Assistant Danny Luckett. Ad Manager Roger Mullins. Deputy Ad Manager Perry Hodder. Sales Executive Richard Power. Ad Production David Noakes. Publishing Services Executive Seran Anderson Haddick. Group Editor Tony Quinn. Managing Editor Ellen Brush. Publisher Seamus Geoghegan. Publishing Director Michael Potter. Editorial Director Christopher Ward. Published by Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Tel: 01-490 1444. Telecom Gold 81: R1D001. Micronet 919992492. Printed by Riverside Press, Gillingham. Typeset by Ican Communications Group, Harlow. Colour by Trumps Studio, Ware, Herts. Print production by Aquarius Print and Design, London. Distributed by BBC Magazines, 35 Marylebone High Street, London W1. Redwood Publishing 1988. All rights reserved. Acorn is a registered trademark of Acorn Computers Ltd. Redwood Publishing is a registered data user. ISSN 0263 7456

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* With Green Monitor	£ 729.00
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### 310 SERIES

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### 310M SERIES

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\* **BBC MASTER 128 £349.00**

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* Acornsoft Viewstore Manual	£ 10.00
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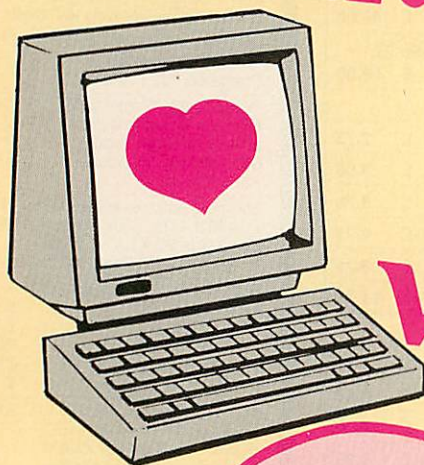
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# NEWS

## Schools must wait for micro report

A report by the National Council for Educational Technology is being sat on by the Department of Education and Science. Meanwhile teachers, whom the report was supposed to help, struggle to choose between the huge range of computers which are offered by manufacturers that are currently fighting over the education market.

The NCET tested 12 machines, both for the features recommended in guidelines issued by the DES in 1987 and for compatibility with existing hardware in schools – the Master 128 and Research Machines' Nimbus.

Compatibility with various networks commonly used in schools including Econet and Nimbus Net, was also tested.

The NCET had originally planned to release its findings at the turn of the year, and it is now anxious to make the results of the survey known to the public.

The first months of the year are a peak buying time in education; BETT, the major exhibition, is held in January, and the end of the financial year is in April. Education authorities are being deprived of advice at the time when they most need it.

## Ecology on the Arc

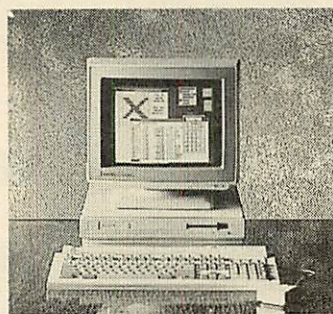
Innocent Software has compiled versions of three of BBC Soft's existing educational programs for the Arc. *Ecology and Conservation*, *Relationships* and *Food and Population* all come from the Science Topics series. The price of each package is £29.95.

## Half-price Unix

Acorn has announced prices and configurations for the R140, its Unix workstation revealed last month in *BBC Acorn User*.

The most basic system costs £4025, but it lacks a monitor and Ethernet interface. You do get a full 'Archimedes 440-like machine' with 4Mb of RAM, a 50Mb hard disc, and a year's on-site maintenance.

For £4541, you also get the 'Thick wire' and 'Thin wire' Ethernet connections to connect the R140 to other Unix machines, plus the Arcs' MS-DOS emulator. You can add a normal mono monitor, a



multisync unit, or a high-resolution 1152-by-900 pixel mono monitor.

The hard disc contains the Acorn version of the Unix operating system, known as Risc iX, which is a full version of Berkeley Unix release 4.3, plus System V

kernel extensions, Sun NFS, TCP/IP standardised networking and Xii windows compatibility. As reported in December 1988's *Acorn User*, IXI's X-Desktop is also included to give an easier-to-learn face to unfriendly Unix for first-time users. The machine can also run all Archimedes Risc OS software.

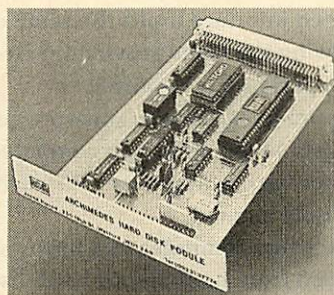
Two vital add-ons are due to be released by summer – a Small Computer System Interface (SCSI) podule to allow you to add extra hard discs or other devices, and the long-awaited hardware floating point card which is based on the WD32206 maths chip.

Acorn has recruited more marketing staff to sell its new Unix workstation in higher education. New industry marketing manager Warwick Hirst was marketing manager for Torch, and specialised in selling Unix systems based on Torch Triple X and Quad X machines to both government and industry.

Frank Burdett, higher education adviser, joins from Bath University where he used to lecture in geography. With a doctorate on computers in education he is well-placed to offer advice.

## Arc hard discs

Watford has come up with a cheaper Winchester disc upgrade for the Archimedes 310. For £436 you get the interface



Watford's cheaper Arc upgrade

podule and a 20Mb hard disc unit – and it's compatible with Acorn's own £573 version of the upgrade.

To fit the hard disc, you'll need a backplane. There are two Watford versions, for two or four podules, at £29 and £44. And add another £10 for the fan – you'll find it gets pretty hot without it if you fit a full complement of podules. A fan is necessary if your machine is still under guarantee.

## Acorn ARM chip gets a boost

This year will see Acorn's ARM chip powering a range of computers and peripherals from other manufacturers. VLSI Technology, which makes the chips for the Arc in Temple, Arizona, knows of about 20 computer companies designing products using the chip.

VLSI's Jim Farrell said: 'We expect a large computer

company to make an announcement at the Spring Comdex fair in May. About four companies could make announcements.' He refused to divulge further details, but stressed that the products would go beyond the embedded applications like laser printer controllers which are expected. And Sanyo, which

also makes ARM chips, is known to be close to announcing products based around its particular version.

The chip's commercial prospects outside of Acorn have been boosted by the publication of a technical manual about it, which is available from specialist booksellers and VLSI itself.



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## NEWS IN BRIEF

■ Computers play a large part in the therapy and education of the physically handicapped, but their role in helping the mentally handicapped and in the rehabilitation of the mentally ill receives less publicity. To redress this the Westminster Association for Mental Health has organised a seminar 'Computers and Mental Health: from therapy to employment', on behalf of the Mental Health Foundation. The seminar will be held on February 21 at the King's Fund Centre in Camden, North London.

■ Technology-conscious Feltham Community School is holding its annual exhibition, Technology 2001, on March 2 this year. Last year a wide range of companies including giants such as British Petroleum and Honeywell Bull attended and demonstrated their products and use of information technology to pupils and parents, and the school hopes to attract the same range of companies this year.

■ Busy Arc owners can now keep their dates intact with a new desktop diary, £9.95, from Quercus Computer Systems. Its *QCS Diary* is fully compatible with standard desktop files but also offers full screen over-view, a part screen for each day, and can create files for the years ahead. Files can be printed out on a wide range of printers as the Quercus package includes a printer driver generator.

■ Human Computer Interface is offering discounts for schools and education centres on BBC connectivity products. The Cambridge-based firm has reduced its prices on the *View to Mac* version 2 from £59 to £47.20 each for orders exceeding 10 copies. Similar discounts are available on products such as *Screen to Mac* and serial transfer cables.

# BBC puts programs first on television

The BBC is renewing its commitment to computing with a two-hour special to be broadcast on BBC1 on Sunday April 2. The programme is provisionally titled *Micro File*, and its three presenters have yet to be chosen, but producer Bryn Brooks intends to fill the show with examples of all the ways in which computers can be fun and useful.

'It's meant to be a review of computer software, presented in a totally non-technical way to people of all ages who maybe have access to a computer at home but aren't experts,' Brooks explained.

'We want to show that you can do much more than word processing and playing games.

As much software as possible will be shown on six different machines, the original BBC, the Archimedes, the Amstrad (representing IBM-compatibles), Nimbus, Atari and Commodore Amiga.

The programme's titles and music will be produced by non-experts and children using



Hardware, experts and programming banished in new approach.

basic drawing and design programs and the *Hybrid Music System*.

The often boring subjects of databases and spreadsheets will be made interesting by analysing data collected using the BBC's own *Birdspy* program as part of the RSPB's worldwide birdwatch in January. This will be compared with the RSPB's own data on birdlife in Britain, and the team will navigate from the BBC to the RSPB in Sandy and back using the *Autoroute*

road-finding program and a lap-top computer.

Several teams will use desktop publishing software to compile and publish news of the day's activities. Other groups will be designing castles, planning and building fairgrounds with *Control Logo*, and using computers to research their family history with the help of newsreader Gordon Honeycombe. A follow-up programme screened at 11pm will show the results of activities during the day.

## Boost for Hypertext

Logotron has released a new catalogue of educational software for 1989.

The catalogue highlights new products, including maths program *Numerator* (the Master 128 version is reviewed by Martin Phillips in this issue) and *Hyperbook*, which enables users to create indices, glossaries and cross-referencing for books and documents and allows you to jump rapidly from text items to related areas of the document.

Both programs are available for the Archimedes in line

with Logotron's new policy of supporting the newer, more powerful micros in schools.

*Hyperbook* is a joint venture with book and software publisher Longmans, and several texts for use with the program are being published to coincide with the launch of the *Hyperbook* package - including *Hamlet*, the Gospels and the Acts of the Apostles, and the Educational Reform Act. Prices for these texts will range between £10 and £25 with the *Hyperbook* program itself costing £56.35.

## Drawing on animation

Silicon Vision has released two more technical programs for the Archimedes and BBC computers. *Realtime Solids Modeller* is available only for the former, at £89.95, and is aimed at both educational and professional users in CDT, engineering and architecture.

*SolidCAD*, available for both machines at £49.95, is a 3D drafting program; BBC users can transfer designs to the same company's *Real-time Graphics Language* program on the BBC model B.



# CD jukebox masters hits

Arbiter Leisure's Discmaster CD jukebox may look as if it's just dropped in from outer space, but the components inside will be quite familiar to BBC users. The thousand or so tracks on the 60 CDs inside are controlled and selected by a computer. There's a Master 128 hidden inside the mushroom-shaped box.

'With CD jukeboxes there are so many titles to display that you can't do it with paper cards like old-fashioned jukeboxes,' explained Joanne Arbiter of Arbiter Leisure, designers of the Discmaster. So in the centre of the unit's

circular top, designed to look like a compact disc, is a screen displaying a scrolling list of titles, and touch sensitive keys for customers to make their choice of tracks.

'People put money in jukeboxes just to play with them like toys, as much as they do to hear the music, so the computer makes it fun. And the Discmaster's design is more interesting than other recent models,' said Arbiter.

You can test the Discmaster jukebox in around 700 pubs across the country and in the CD department of Tower Records in London.

A London housewife was spared the expense of buying herself a home computer by winning an Archimedes. Theresa Elliot was the first out of the hat in the Great Monument Grand Draw, organised by the Muscular Dystrophy Group. The Acorn-donated prize was handed over at London's Monument. £20,000 was raised for muscular dystrophy research.



## US Gold for the Arc

Slowly but surely, the Archimedes is getting support from the larger games software houses. The latest, the giant US Gold, has two games in the pipeline: *Joan of Arc* and *Leaderboard*.

The first is a classic role playing game about the maid or Orleans, while the latter allows you to experience the excitement of a professional golf tournament. Both have been completely rewritten for the Arc, to make full use of

the advanced graphics and sound. *Joan of Arc* was actually developed in France by a company called Chip.

Development manager David Baxter said: 'Other games will follow, depending on the success of these two.' New games are likely to be conversions of existing software, although with the superior performance of the Arc, they should be even better than their 16-bit counterparts. US Gold are on 021-356 3388.

### CUSTOMER HOTLINE

■ Response to the first Customer Hotline columns has been very gratifying. Here's how to get the best from Acorn's customer support staff. Comprehensive technical and sales support is regarded as essential, and Acorn's strategy calls for repairs and servicing, technical help, general information, application information and training services, as well as attention to customers' individual problems.

The Customer Services department is staffed by technical and market specialists. It provides direct support for educational customers, but most support to home users is through your dealer. Although written enquiries to Acorn are always dealt with, technical support by telephone is provided only to dealers or educational customers - not for general users. This means Acorn can offer special support for education, while still ensuring that home and business micro owners get a high level of support through the dealer network. The dealers attend training courses, and can phone for answers to specific queries. So if you have a problem, try your local dealer first. If this fails, then write to Customer Support. But please - don't ring us!

■ There's a competition running on SID, Acorn's Support Information Database. The prize is a copy of *Corruption*, the Archimedes graphical adventure game from Magnetic Scrolls. There are 10 copies to be given away, courtesy of Rainbird Software, so get dialling! You've got until the end of February. In case you aren't a registered SID user, you can access SID with a modem by dialing (0223) 243642 and using standard Prestel ter-

minal software and Viewdata protocols. You can get full details of the competition on SID with \*SIDCOMP#.

■ One of the things Customer Support does is to issue application notes on a wide range of programming subjects, from merging *ViewStore* databases to using the serial port on the Archimedes. But it's often quite difficult to know what a good topic is for a new application note. So if you've any suggestions on application notes you would like to see available, please write to me and I'll see what can be done.

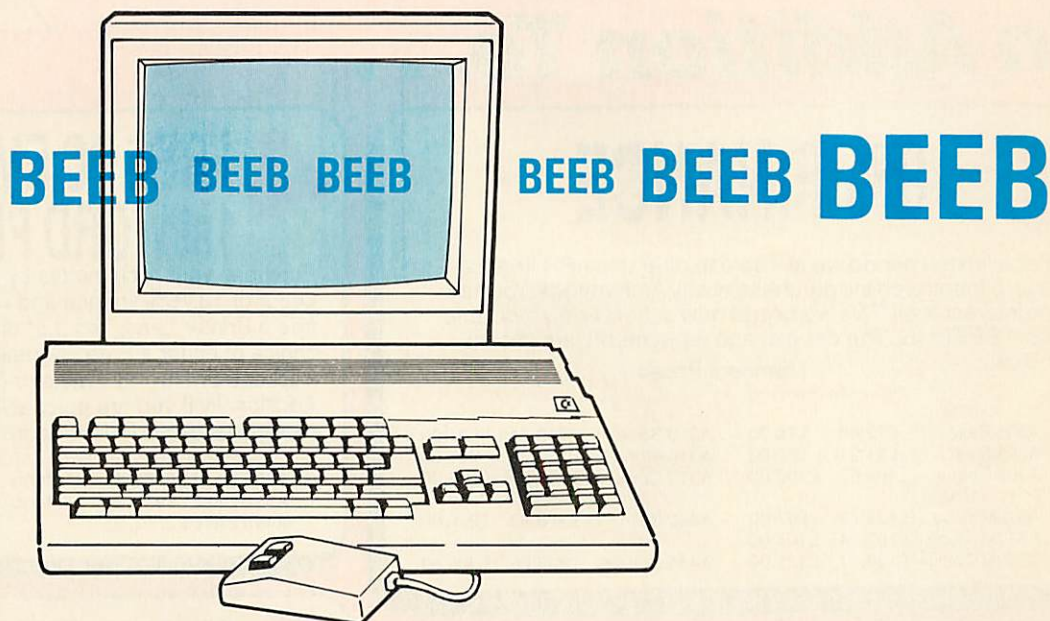
■ This month's featured application note - *Using the serial port* - covers most aspects of using modems or other serial devices on the Archimedes. It details using the serial patch that corrects some bugs in Arthur 1.2, wiring up a cable and writing software to use the serial port. As usual, the application note is available free on request from Customer Support. If you include a formatted 3.5in disc, we'll put the serial patch on it for you.

■ A reminder to owners of Archimedes compilers. If you have a copy of the Pascal, Fortran or C compilers, then you can get an upgraded version too. You can upgrade by sending the original compiler disc and a cheque for £30 (per compiler) to Acorn Direct, Studland Road, Kingsthorpe, Northampton NN2 6NA. The upgrade is required before you can use the symbolic debugger which comes as part of the *Software Developer's Toolbox*.

■ You can write to Phil Colmer and the Customer Support department at Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. If you've got a suitable modem, you can leave a message on SID.



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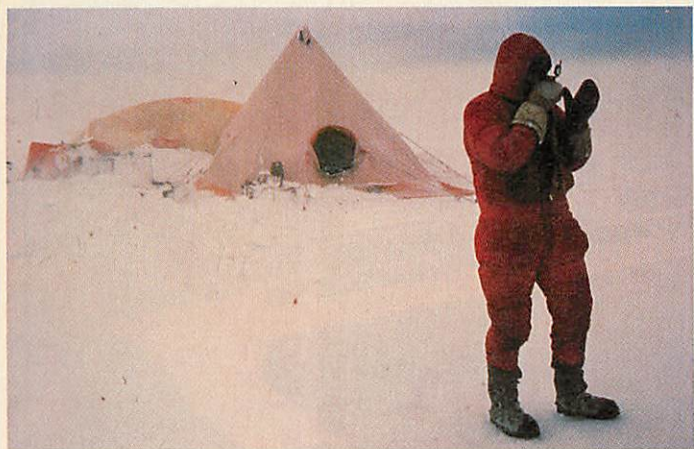
Address

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AU 3/89



# BBC and Virgin launch IV discs



Join Sir Ranulph on his trip to the North pole

BBC Enterprises continues to win prizes with its range of interactive videos. The new *Countryside* disc won first prize in the education category of the British Interactive Video Association's Awards. The disc aims to give townspeople an understanding of the future of our countryside. Jan Maulden at the BBC's Interactive Video Unit said 'We are lucky to have a very experienced team of senior BBC producers who are hooked on the idea of marrying the disc and the computer.'

Richard Branson's Virgin

group has also entered the world of interactive video with *North Pole Expedition*, the first of a range of discs. Unlike the BBC's discs the computer information is carried on separate floppy discs.

Based on Sir Ranulph Fiennes' real-life crossing of the Arctic, it boasts video footage from the expedition. Five students can participate, re-living the roles of the explorers. The discs come with a book of the expedition and cost £228.85. This package will be followed by further discs.

## More Dabs books

Registered Dabs Press customers who own the Archimedes ABC Basic compiler package should have found an upgraded version of the program in the post at the end of January. ABC Version 2 contains new features including support for return parameters in procedures, a full package of local error handling and four new compiler directives. It comes with an updated user guide.

Dabs will also be publish-

ing a second collection of IBM-compatible shareware at the end of February, costing £29.95 for the Master 512 and £35 for the Archimedes with PC emulator.

More user guides are in the pipeline with brothers Alex and Nick van Someren's *Archimedes Operating System - a Dabband Guide*, and Chris Snee's *Master 512 User Guide* available at the end of February. Prices are £14.95 and £9.95 respectively.

## THE COMMS COLUMN

■ A new service has been launched for Telecom Gold which outputs messages by voice, over a normal telephone, allowing users to access their mail from anywhere in the world without having a computer or modem available. Also copies of email and telexes can be forwarded onwards, for example, to fax machines - ideal if you are, say, travelling on business. With a fax available but no computer, you can redirect the voice message to the fax machine where you are staying. The talking TG service costs 24p per minute (12p per minute off-peak), plus £5 per month subscription, and £40 for the starter pack which includes a DTMF keypad to key in your ID, and other information. More information from Fuchsia Ltd on (0253) 892737.

■ Micronet has a special New Year offer for new subscribers - the cost of the first quarter's subscription is reduced from £20 to £9.95. The offer runs alongside Micronet's existing free modem offer for annual subscribers. At the same time Micronet is supplementing its domestic daily micro news coverage with the inclusion of *NewsBytes*, the international online computer news service from the USA.

■ Also new on Micronet is a reorganisation of the telesoftware section. Chargeable telesoftware no longer exists on the system, and free telesoftware is provided via a gateway through to an Amiga 2000 computer sitting in Micronet's offices, which contains the telesoftware files for a number of machines including the BBC B/Master. Free software for the Archimedes and Z88 is planned for the future. Micronet aims to become the prime supplier of free and public domain software.

■ We always like to feature bulletin boards with a purpose other than computing in this column, and an interesting one I have found is the Academics board, run by John Kelly on 021-705 9677 (24 hours, V21/V23), which exists to provide contact between Open University students. The board's download section is mainly for PC users (of course suitable for Master 512 and Archimedes PC Emulator owners), but there are many useful text files as well. To join the closed user group on the board, you must supply your Open University registration details.

■ Bulletin board spotlight this month falls on the Bradford Bulletin Board, which operates as you might expect, from Bradford, at V21 (300/300 baud) and V23 (1200/75) baud speeds. The board runs on a BBC B, using SAFBBS software, written by Sarfraz Hussein, who can be contacted on the board. The modem used is a Pace Series 4.

There is plenty of BBC downloadable software and feature sections, some of which are closed user groups. For example, there is an area on the board specifically for members of the Wakefield BBC User Group, one of the few remaining seriously active BBC User Groups.

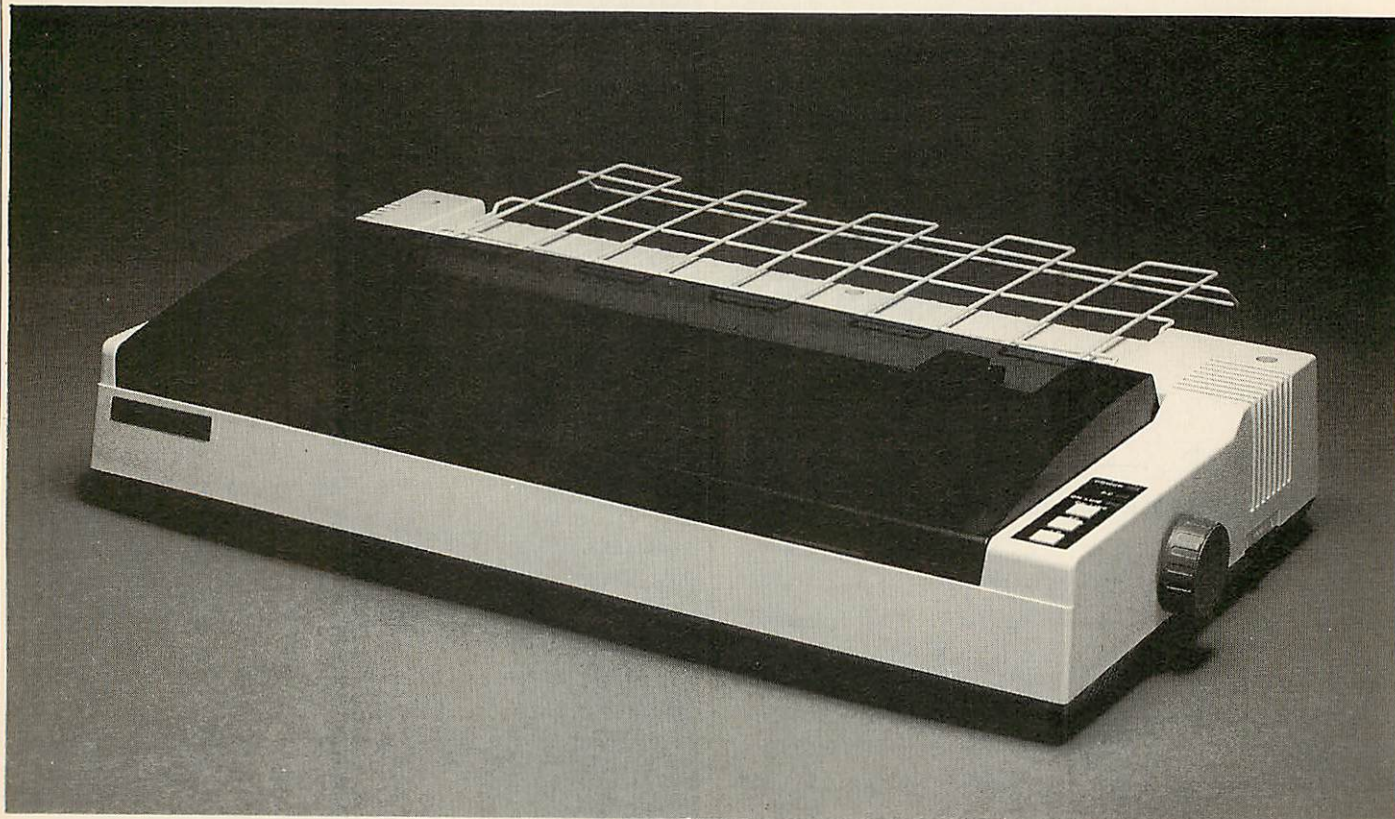
This board allows you to download a complete UK bulletin board list. The SAFBBS software fully supports scrolling and Viewdata formats - further information on this BB software is also available on the board. The Bradford Bulletin Board is on (0274) 480452.

■ Comms news for David Atherton can be sent to BBC Acorn User, or to his mailboxes on Prestel 942876210 or via Telecom Gold/Microlink 10072: MAG 11596.



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## NEWS IN BRIEF

■ Schools who want an on-site demonstration of the Archimedes will now be able to do so without any charge or obligation. And they'll also be able to obtain a copy of *Micro News*, the Acorn video which demonstrates the Arc's potential for the classroom.

This is part of Acorn's new free Schools Service. This will apply not only to Acorn's own products but also to software and hardware producers who create products related to its machines.

Details of the Schools Service will be arriving in larger secondary schools during March, while smaller secondary and primary schools will be approached later on.

■ School users of on-line systems can now dial into the French Teletel system more cheaply. Until now, the full service has only been available in the UK through an international phone call. Direct dial access from outside France is now being phased out by French Telecom.

Aldoda now offers Minitel-NETpi. The PSS gateway gives full access to Teletel, including the business and professional services. Subscriptions to MinitelNETpi are bought on the basis of blocks of time so, for example, five hours, access costs £48.

■ *Databox* (£19.95 for a teacher and three student packs) from Soft Teach is a database program designed to tie in with GCSE Computer Studies work. It tackles data capture, validation, verification and handling on a BBC B, Master, and Econet.

*Go for it!* (£14.95) is based on the BBC TV health programme of the same name. It is designed to raise awareness of dietary habits at junior and secondary level. It also looks at the issues raised by alcohol and tobacco.

# SEMERCs to go

By Nick Evans

This April sees the end of national funding for SEMERCs (Special Education Microelectronics Education Regional Centres), originally founded under MEP (Microelectronics Education Programme). Some of these centres have been taken over by LEAs, other are disappearing, but MESU has encouraged the development of regional resource centres in Oldham, Bristol, Newcastle, Doncaster, Surrey and Hertfordshire.

These centres will build on the 68 advisory teachers who were appointed under the ESG scheme specifically for Special Educational Needs. It is hoped that MESU will be



Funds won out for Special Needs centres

used as a focus for activities including INSET support and software development, adding to the work that has already gone on in the five national SEMERCs.

MESU's aims have been directed by responses to a survey it undertook recently,

which highlighted the need for continued support in many areas, not least in terms of keeping alive the Special Needs Software Centre in Manchester and the continuation of the ACE Centres which deal with children with communication difficulties.

## No equality yet

Equality for girls hasn't reached the school computer room yet, claims Celia Hoyle, professor of mathematics of London University's Institute of Education. Computer use is still dominated by boys.

Professor Hoyle's observations appear in a book published by the University. She emphasises the need for cross-curricular use of new technology as a means to break the mould of single-subject study of computers.

Studying computers themselves tends to be a favourite option for boys. In a com-

puter class the environment created by the teacher is less likely to be supportive for girls.

Professor Hoyle notes that there is less likelihood of girls having access to computers at home. And the pressure for boys to study a traditionally male subject tends to exclude girls in much the same way as was the case with heavy craft and engineering subjects.

*Girls and Computers - Bedford Way Paper 34* costs £5.50 from the Institute of Education, 20 Bedford way, London WC1H 0AL.

## New data files for ITV Key

There are new datafiles available for ITV's *Key* database management system. The *Flowers from Seed* and *Vegetables from Seed* datafiles come complete with a Sphere paperback book. The data allows you to cross-reference entries with the book and discover, for instance, the range of plants needed to supply vegetables throughout the year. Or you can choose plants for different environments.

The *Antarctica* file has details of the exploration of the icy continent, its wildlife and the scientific bases there. *Periodic Table* enables pupils to examine the range of properties associated with each element; similarly the *Rocks and Minerals* file allows an in-depth study of Earth sciences tied in directly with the objectives of the National Curriculum. All the files cost £15 from your local regional ITV education officer or the ITV Association.

## Free education discs

Peter Davey is providing a free program service for anyone involved in adult basic education. The programs cover numeracy and literacy and so far run to 11 40-track discs of software. One set of programs aimed at visually handicapped pupils uses Su-

perior Software's *Speech!*

To get them, send 11 blank formatted 40-track discs plus £1 to cover documentation and postage. Details are available from Peter Davy, 68 Headlands Road, Ossett, Wakefield, West Yorks WF5 8HX, tel (0924) 274403.



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## ProArtisan has its faults

Unsurprisingly, *ProArtisan* is an advanced version of *Clares Artisan*. On screen and in use, there's not much difference between the two. The most notable change is the screen mode – *ProArtisan* uses the 256 colours of mode 15. But there's no way of changing the 'default' set of 256.

Clares has taken the original *Artisan* and added several new features while updating and improving existing parts



Easy shading effects

to make use of the extra colours. You can now pick a selection of 22 predefined groups of colours with which to fill. This means that realistic graduated shading effects are quick and easy.

An airbrush facility has been added for all you budding 'graffiti' artists. Another brush allows colours to be 'smudged' together, or to give a 'soft-focus' effect.

There's now also 'true' cut and paste – the cut area can be irregular, not just a rectangle. Once created, sprites can be squeezed into any solid area of the screen, and deformed into a circle, say.

*ProArtisan* is not cheap at £169.95. And it still has its faults; it is still impossible to see what is being changed when using the pixel-editor, sprites can't be moved off the right of the screen, and the menus disappear too quick for my liking. It is an extremely versatile tool, which should find its way into several professional design studios.

Rob Miller

## Domesday at the North Pole

Virgin's £229 *North Polar Expedition* is the first non-BBC software for the 'Domesday' advanced interactive video system. At first sight, Sir Rannulph Fiennes Transglobe expedition could make an exciting video subject. But the result is a tired question and answer format in what should be an innovative new medium. Typical is 'How many 10-litre cans of fuel should you load? Point to one of four answers on the screen'. There are five sets of questions, and five 'roles' to play – mechanic, navigator, pilot, base camp controller and team leader.

In fact all the answers are in a giant 500-page paperback book of the expedition that comes with the pack. The



Sir Rannulph Fiennes – in the cold

short video clips don't offer much in the way of explanation, and often you can't go back and modify your answers when you get something wrong. The video content sometimes seems almost superfluous – this could have been a normal floppy disc package with little loss of educational value.

All of the moving video footage was gleaned from existing documentary material. Screen presentation often seems cluttered, with numerous computer-generated icons and windows obscuring the 'TV' picture. And there's little use of sound. All the computer software is on two floppy discs – Virgin hasn't made use of the LV-ROM capability to put the software on the laser disc itself.

*North Polar Expedition* could have been a good use of interactive video. But it misses so many opportunities. Schools which are desperate for more uses for their Domesday systems aren't quite this desperate yet.

Graham Bell

## Monochrome monitors make the grade

Taxan monitors have a good reputation, and the latest KX119 models look set to live up to the standard.

I checked the amber screen version with a BBC micro. The case is a neat grey, very boxy in shape and considerably larger looking than some monitors like the Zenith ZVM1200. It comes with a moulded mains plug and a video lead. The one supplied is suitable for a Compact; make sure you get a BNC-type for a model B or a Master.

There's a comprehensive range of controls for horizontal and vertical hold, position, and size on the back, plus a tool to adjust them. It's worth persisting with these.

When switched on, the screen shows a pleasant orange shade, but on the first monitor I tried, it was too dark. The brightness and contrast controls on the right side of the monitor were little help. In fact, it was necessary to re-



Taxan KX119 monitors

adjust the brightness control on the monitor's circuit board – not recommended unless you're a TV service engineer. The focus control also needed tweaking. But a second monitor I checked was perfect – so see the one you're going to buy working if possible.

Once set up properly, the two monitors worked well; they display a good steady picture and perform well with Chris Drage's monitor test programs from December 1987. If you want a mono monitor, they are more expensive than most, but good value at around £95.

Graham Bell

## Neater labels

Wight Scientific has launched another package to follow its excellent *Signwriter*. The new package is *Labelwriter*. Where this package rises far above the crowd is flexibility.

You can define the label size, and the number of labels on the page. Once this has been done, you can then print out as many or as few labels as you wish. There are various menus which allow you to set up – any print style available on an Epson-compatible printer. You can also create text in *Signwriter*, and then combine that with your label in *Labelwriter*. Indeed, the *Labelwriter* disc itself is printed using this facility, and there are full instructions in the manual to do this.

The most powerful feature is the ability to make use of a database of addresses created with a wordprocessor, and then print sheets of labels out, with a different address on each label. It makes mailshots a piece of cake.

Kevin Kealy



## Contacts

**Acorn Computers**, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

**Aldoda International Ltd**, 27 Elizabeth Mews, London NW3 4HH. Tel: 01-586 5686. Gold/TTNS 74: LOT 1105.

**Arbiter Leisure**, Unit 8, Eldonwall Trading Estate, Staples Corner, Priestley Way, London NW2 7AF.

**BBC Enterprises**, Woodlands, 80 Wood Lane W12. Tel: 01-576 0202.

**BBC Interactive Television Unit**, BBC Elstree Centre, Clarendon Road, Borehamwood, Herts WDJ 1JF. Tel: 01-953 6100.

**Clares**, 98 Middlewich Road, Northwich, Cheshire CW9 7DA. Tel: (0606) 48511.

**Dabs Press**, 5 Victoria Lane, Whitefield, Manchester M25 6AL. Tel: 061 766 8423.

**Human Computer Interface**, 25 City Road, Cambridge CB1 1DP. Tel: (0223) 314934.

**Innocent Software**, Benowyn, Park Form Road, West Wycombe, Bucks HP12 4AF. Tel: (0494) 462969.

**ITV Association**, 6 Paul Street, London EC2A 4JH. Tel: 01-247 5206.

**Logotron**, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

**Minerva Software**, 69a Sidwell Street, Exeter, Devon EX4 6PH. Tel: (0392) 437756.

**Silicon Vision**, Signal House, Lyon Road, Harrow, Middlesex HA1 2AG. Tel: 01-422 2274.

**Soft Teach Educational**, Sturgess Farmhouse, Longbridge Deverill, Warminster BA12 7EA. Tel: (0985) 40329.

**US GOLD**, Unit 2 & 3, Holford Way, Holford, Birmingham B6 7AX.

**VLSI**, 486-488 Midsummer Boulevard, Saxon Gate West, Central Milton Keynes, MK9 2EQ. Tel: (0908) 667595.

**Virgin Publishing**, 2-4 Vernon Yard, 119 Portobello Road, London W11 2DX. Tel: 01-727 8070.

## In next month's issue

Next month in *BBC Acorn User*, there's a superb type-in game for Easter: *RuneMaker - Codename Druid* is just right for our 'Spring equinox' April issue. It could be the best BBC game ever published in a magazine, and features druids racing to run around Stonehenge before sunrise. Plus there are runes to collect, and even riot police to avoid.

Back from his holidays, Joe Telford describes ways to make Basic programs make use of wordprocessor files. The yellow pages contain a program to make up multi-column text in *View*.

Roger Carus concludes his

look at current business software for the Beeb. From Dave Fitcher, there's a round-up of fancy font software for the BBC micro - *Fontwise*, *Multi-font NLQ*, *Hyperdriver* and so on.

For the Archimedes, there's a description of the floating-point emulator, and how to make use of it in your own Archimedes programs.

And there's an in-depth look at a system that provides the Arc with the original object-oriented programming environment - *Smalltalk-80* from Smalltalk Express.

Plus, of course, all the regulars.

## BLUNDERBOX

People who have bought the *Acorn User Games* disc may have experienced some problems in getting it to work on a BBC model B. If you are one of the unlucky few, you can obtain a list of changes to configure the disc for a model B by sending an sae marked 'Games Disc Changes' to *BBC Acorn User* Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

## Teacher talks

The National Council for Educational Technology is organising CAL 89, the ninth in a series of biennial conferences on computer assisted learning. The conference is being held on 11-14 April at the University of Surrey in Guildford. Further details are available from Diana Bourne, PO Box 32, Salisbury, Wiltshire SP5 5HD.

## Technomatic

Technomatic has expanded and moved its office to: 468 Church Lane, London NW9, 8TQ, tel: 01-205 9558.

## Diary dates

21 February, Computers & Mental Health Seminar, King's Fund Centre, London NW1. Contact: G Evans, Portugal Prints, Parish House, Portugal St, London WC2, 01-404 4267.

21-24 February, Which? Computer Show, National Exhibition Centre Birmingham. Contact: Cahners Exhibitions 01-891 5051.

## Price Increase

The £1 increase in the cost of our reader service comes after several years of charging the modest figure of £3. The increase is simply to help cover our own costs — in fact, it costs us more than £4 in time and effort to answer each query. But readers can still be sure of getting detailed and helpful replies where possible for the new fee of £4.

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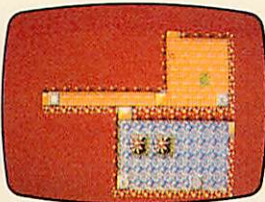
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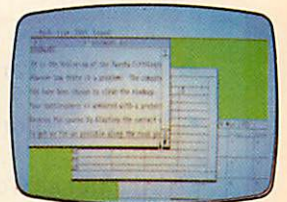
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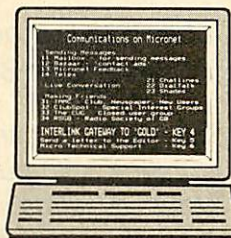
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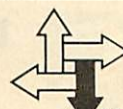
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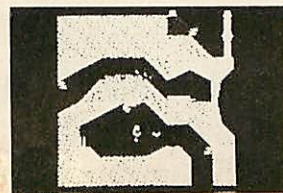
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1st Word Plus (Arch)	£75 (c)	Logistix (Arch)	£95 (d)

Computer Concepts			
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Wordwise	£30.00 (d)	Wordwise +	£37.00 (d)
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Fleet Street Editor	£31.00 (d)	Fonts and Graphics	£11.75 (e)
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Fontwise +	£16.00 (e)	Replica III	£11.00 (e)
VINE MICRO REPLAY (State M/C and Disc Interface)			£30.00 (e)
Artisan (Arch)	£31 (e)	Artisan Support	£16 (e)

NB It is essential to state machine and 40/80T when ordering software

## Books (No VAT on books)

Master Ref. Manuals Pt1	£14.00 (d)	Pt 2	£14.00 (d)
Advanced Master ref Manual (Bray & Dickens)			£19.95 (d)
Lisp	£8.00 (e)	Forth	£8.00 (e)
BCPL	£14.00 (d)	View Guide	£6.00 (e)
View 3	£9.00 (e)	View Sheet	£9.00 (e)
Archimedes Ref manual			£29.95 (d)
Arm assembly language manual			£12.95 (e)
Mastering View ViewSheet and ViewStore			£12.95 (e)
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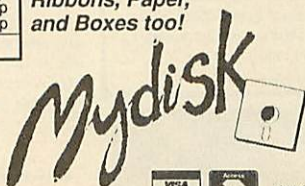
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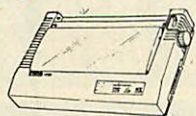
**See page 79**



A



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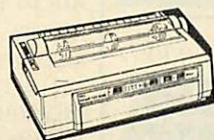
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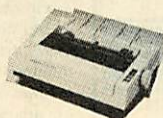
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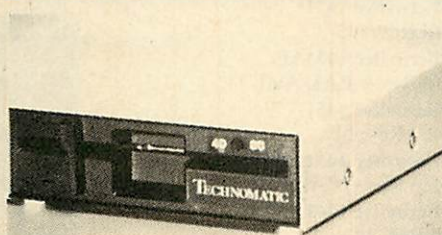
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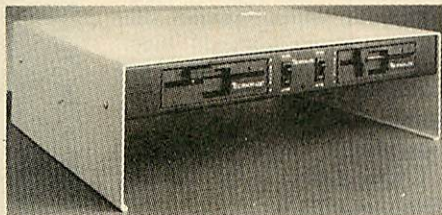
# TECHNOMATIC

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A range of high quality high performance drives to meet the needs of all BBC Micro Users.

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6264LP-15

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(Carriage code d)

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Star LC10 £179(a)

Star LC10 Colour £225(a)

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Larger Plotters available. Please enquire.

## PRINTER ACCESSORIES

### SERIAL INTERFACES

Epson 8143	£32(d)	Epson 8148 (8K buffer)	£79(d)
Nat Pan KXP17	£39(d)	Taxan	£49(d)

### RIBBONS

LX800/86/800, MX/RX/FX80/85/800/850 £4(d)

MX/RX/FX100, FX105/1000/1050 £6(d)

LQ500/800/850 £5(d)

LQ1000/1050, EX800/1000 (Black) £8(d)

EX800/1000 £16(d)

LQ2550, JX80 £13(d)

StarLC10/NL10, NatPan KXP1081 £4(d)

LC10 Colour £6.50(d)

Taxan 810/815/910/915 £5.75(d)

Integrex Black Cartridge £8(d)

Integrex Colour Cartridge £14(d)

Juki 6100 £1.80(d) Brother HR15/20 £4(d)

HI80 Pens (4) (Aqueous or Oil Based) £6.90(d)

Hitachi Pens (6) Aqueous £18.50(d) Oil £25(d)

Colour option EX800/1000 £35(d)

### CUT-SHEET FEEDERS

LX800 £70(b) LQ500 £75(b)

FX/LQ/800/850 £135(b) FX/LQ1000/1050 £179(a)

EX800 £150(b) EX1000/LQ2500 £210(a)

StarLC10 £55(b) Brother HR20 £229(a)

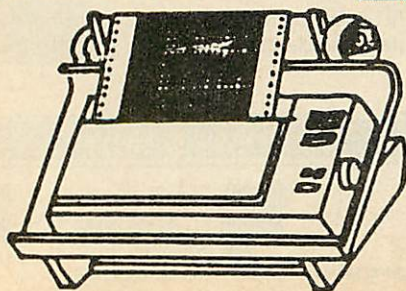
### TRACTOR FEEDS

LQ800 £44(b) LQ1000 £55(b)

LQ850 £70(b) LQ1050 £85(b)

## PRINTER STAND

A new style printer stand with easy paper feed and paper separation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. £26 (b)



## PRINTER BUFFERS SHARER & CONVERTERS

### TSB 256 Auto Sharer/Buffer

256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. £169(a)

### Smart Printer Buffers

Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.

For serial: X-on/X-off, ETX/ACK or DTR/DS protocols independently selectable baud rate for each port

PP256 256K Parallel buffer £169(b)

SS256 256K Serial buffer £189(b)

### Parallel Multi-Spoolers

Allows connecting 2 printers to 2 or 4 computers

Butter allows quick dumping of data to free the computers

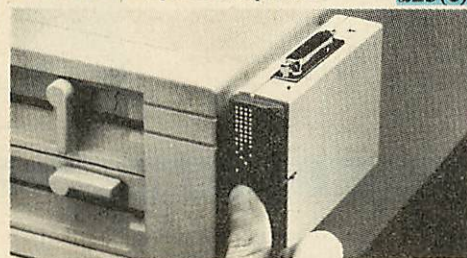
COPY allows upto 999 copies, SELF-TEST.

PAUSE, CLEAR

MS422 4computers/2printers 512K buffer £299(b)

MS223 2computers/2 printers 512K butter £199(b)

Compact Two Way Switch 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer £23(c)



### Serial/Parallel/Serial Converters

Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols

C-PS Parallel/Serial converter £35(c)

C-SP Serial Parallel converter £35(c)

Add £49 to above prices for units with 64K buffer

### Manual Printer Sharers:

(All lines are switched).

2 computers to one printer Parallel £23(c) Serial £23(c)

3 computers to one printer £30(c) £30(c)

4 computers to one printer £36(c) £36(c)

2 computers to 1 or 2 printers £49(c) £49(c)

Cable sets for above sharers available for all popular computers

### BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable £21(c)

### Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9 1/2 x 11" £12(£3.50)

2000 sheets 14 1/2 x 11" £18.50(£4.50)

1000 Sheets A4 90gsm £12(b)

500 A4 80gsm Loose Sheets £3.50(b)

### Labels/1000

Single Row 3 1/2" x 17/16" (d) Triple Row 27/16" x 7/16" £5(d)

OHP Transparencies A4 (100) £56(b)

### PARALLEL PRINTER LEADS

BBC/Master (1.2m) £5(d) BBC/Master (2m) £7(d)

Archimedes (2m) £7(d) Compact (1.2m) £7(fd)

## MODEMS

MIRACLE WS4000 V21/23 £129(b)

MIRACLE WS3000 V21/23 £244(b)

MIRACLE WS3000 V22 £379(b)

MIRACLE WS3000 V22 bis £495(b)

Pace Linnet £139(b)

(All modems are BABT approved)

BBC Data Cable for WS3000/4000 £10(d)

MIRACLE WS2000V21/23 & BELL stds £92(c)

## MONITORS

### 12", 14" and 20" MONITORS

#### Microvitec 1431

Std Res, 14" £175(a)

#### Microvitec 1431AP

Std Res + PAL/Aud, 14" £199(a)

#### Microvitec 1451

Med Res, 14" £225(a)

#### Microvitec 1451AP

Med Res + PAL/Aud, 14" £219(a)

#### Microvitec 1441

Hi Res, 14" £359(a)

#### Philips 8833 14" RGB

Med Res, 14", high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. £219(a)

#### Touchtec 501

£239(a)

#### Acorn Philips

14" Colour Monitor £199(a)

#### Microvitec 2030CS

20" Standard Resolution RGB/Comp Video £380(a)

#### Microvitec 2040CS

20" High Resolution RGB/Comp Video £675(a)

#### TAXAN SUPER VISION 620

12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible £269(a)

#### TAXAN SUPER VISION 625

12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. £319(a)

#### TAXAN 770+

MultiSync Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand £449 (a)

#### NEC MultiSync II 14"

Enhanced version of the original NEC MultiSync complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. £459 (a)

#### ECM 5400 14" Multisync Monitor

Fully compatible with Archimedes IPC Systems. Complete with Tilt and Swivel. £329(a)

## MONOCHROME MONITORS

#### PHILIPS 7752

14" green screen monitor.

This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Inverse video switch, separate brilliance and contrast controls. £85(a)

#### PHILIPS BM 7502

Hi Res green screen £72(a)

#### PHILIPS BM 7522

Hi Res amber screen £79(a)

Tilt & Swivel Stand for Philips Mono £6(c)

## MONITOR ACCESSORIES

#### Microvitec Swivel Base

(14" plastic monitors) £17(c)

Monitor Stand Models B & B+ £10(c)

Monitor Stand Master £13(c)

Double Tier Stand Models B,

B+ or Master £24(b)

Taxan RGB Lead £7(d)

Microvitec Lead £4(d)

Monochrome BNC/Phono Lead £4(d)

Copy Holder Self Supporting A4 £15(c)

General purpose tilt

and swivel stand for 12" and 14" £12(b)





# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

## Archimedes SOFTWARE

### LANGUAGES & PROG. TOOLS

ANSI C/ISO PASCAL/ FORTRAN 77	each £95(c)
PROLOG X/LISP	each £175(b)
TWIN Editor	£27(d)
Archimedes Assembler	£185(b)
Software Dev. Toolbox	£185(b)
RISC BASIC Compiler (SV)	£85(c)
Clares Toolkit	£32(d)
Clares Toolkit+	£41(d)

### WORD PROCESSORS

First Word Plus	£79(c)	Graphics Writer	£27(d)
Pipedream	£89(c)		
Pipedream Spellchecker	£43(d)		

### SPREADSHEETS

Logistix	£95(c)	SigmaSheet	£59(c)
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### ACCOUNTING SYSTEM

Minerva's Suite	each £54(d)
(Order Processing/Sales Ledger/Stock Manager/ Purch. Ledger/Nom. Ledger)	

### EMULATED PACKAGES

VIEW/Viewsheets/Viewstore	each £47(d)
Interword/Intersheet	each £35(d)
Wordwise	£20(d)

### GRAPHICS/ART/CAD

ProArtisan	£145(b)	Artisan	£30(d)
Artisan Support Disc			£17(d)
Auto Sketch			£69(d)
GammaPlot???			£30(d)
System Gamma+			£59(d)
Presenter	£24(d)	SVARC-PCB	£167(b)
SVSolidCAD	£41(d)	SVSuperDump	£20(d)

### GAMES

Hoverbod/Missile Control	each £13(d)		
Orion/Freddie's Folly	each £13(d)		
Zarch	£15(d)	Conqueror	£24(d)
Enthar Seven	£29(d)	Minotaur	£9(d)

### DATABASES

Deltabase	£26(d)
System Delta Plus	£59(d)
Prog Ref Guide	£26(d)
AlphaBase	£39(d)

### MISCELLANEOUS

PC Emulator	£79(d)
HEARSAY Comms Package	£55(d)
MAYA Terminal Emulator	£49(d)
Control (setup utility)	£13(d)

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

### PRIMARY EDUCATION

Astronomy	£8(d)
Computers At Work Aud/Disc	£16(c)
Picture Craft	£17(d)
Introducing Geography	£15(d)
Maths with a Story I Cass	£5(d)
Maths with a Story II Cass	£5(d)
Number Games Cass	£5(d)
Using Your Computer Cass	£24(d)
The Hall of Mirrors	£13(d)
Geordie Racer	£12(d)
Bird Spy	£8(d)
Maths Aud/Disc	£12(d)

### SECONDARY LEARNING

Technology & Design Pt 1	£21.50(c)
Electric Fields	£8(d)
'A' Level Statistics	£19(d)
'A' Level Geography	£13(d)
Inside Information Prog/Cass	£10(d)
Book	£8(d)
Aud	£5(d)
Open Learning Pack D/Aud/Bk	£36(b)
Science Topic (ST): WAVES	£7(d)
ST: RELATIONSHIPS	£7(d)
ST: BONDING	£7(d)
ST: ElecMag. Spectrum	£7(d)
ST: Electronic in Action	£7(d)
ST: Newton & The Shuttle	£9(d)
ST: ECOLOGY	£9(d)
ST: POLYMERS	£9(d)
ST: Classif. & Periodic Tab	£10(d)
ST: Food & Population	£10(d)
Sec Science (SS) Microtech	£7(d)
SS: Mole Concept Disc/Aud	£10(d)

### GENERAL

Vu-Type	£7.50(d)
Vu-Type Professional	£19(d)
White Knight Mk II	£16(d)
(pse specify Compact or 1770DFS)	
Battlefields Cass	£5(d)
A Vous La France Disc	£20(d)
Book	£5.25(d)
Aud (2)	£7(d)
Espana Viva Disc	£19(d)
Book	£6.95(d)
Disc/Aud (2)	£7(d)
Deutsch Direkt Aud	£16(d)
Book	£5.95(d)
Black Queen (1770DFS)	£13(d)
Bismark (1770DFS)	£13(d)

Codes: Cass: Program on Cassette  
Aud: Audio Cassette  
Disc or no Code: Program on disc  
Above Programs are suitable for BBC Computers B,  
B+ & Master

### TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application programme. £29(d)

All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

Technomatic is an authorised dealer & referral centre for Acorn Products.

## BBC FIRM/SOFTWARE

### INTEGRATED PACKAGES

MEGA 3 ROM	£76(c)
MINI OFFICE II	
Disc for Model B & B+	£14(d)
Disc for Master	£16(d)
Disc for Compact	£19(d)
ROM Version (B, B+, M & C)	£43(c)
(For disc version pse specify 40 or 80T)	

### UTILITIES

Acorn ADFS ROM	£26(d)
Acorn GXR GRAPHICS ROM	£20(d)
(please specify B or B+)	
PRINTMASTER	£24(d)
DUMPMaster	£26(d)
SCREEN PRINT	£25(d)

### DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£36(d)
STARdataBASE	£29(d)
ACORN OVERVIEW	£65(b)
(Specify if Compact)	
INTERBASE	£49(d)

### DRAWING PACKAGES

AMX MOUSE with SUPER ART	£59(c)
STOP PRESS (Pagemaker)	£37(d)
(pse specify B, B+, Master or Compact)	
EXTRA EXTRA	£19(d)
MAX	£14(d)
Stand Alone Mouse	£34(c)
MARCONI RB2 TRACKER BALL	
with ICON MASTER (B, B+ Master)	£59(c)
with CURSOR CONTROL ROM (M)	£59(c)
Stand Alone	£45(c)
(Specify if AMX compatible version)	
Cursor Control ROM (M)	£10(d)
FLEET STREET EDITOR (40T)	£26(d)

### WORD PROCESSORS

Acorn View Professional	£50(c)
VIEW 2.1	£35(d)
VIEW 3.0	£45(c)
Double VIEW (ROM)	£20(d)
Double VIEW (Disc)	£15(d)
View Printer Driver Generator	£8(d)
WORDWISE	£24(d)
WORDWISE PLUS	£38(d)
INTERWORD	£36(d)
EDWORD II	£39(c)
WYSIWYG Plus	£15(d)
SPELLMASTER	£42(d)
SPELLCHECK III	£25(d)

### SPREADSHEETS

VIEWSHEET	£36(d)
WINDOMATIC (A VIEWSHEET UTILITY)	£15(d)
INTERSHEET	£37(d)
INTERCHART (A GRAPHICS UTILITY)	£25(d)

### LANGUAGES

META ASSEMBLER	£90(b)
META DISASSEMBLER	£90(b)
ACORN SOFT C	£29(d)
ACORN MICROPROLOG	£50(d)
ISO PASCAL	£51(c)
ISO PASCAL SAG	£30(d)
OXFORD PASCAL (for B or B+)	£32(d)
(pse specify 40 or 80 Track)	
OXFORD PASCAL for Master	£49(d)
LOGOTRON LOGO	£49(c)
Advanced BASIC Disc	£12(d)
(for B, B+ or Master with 2nd Proc)	

### COMMUNICATIONS

TERMULATOR (BBC B or B+)	£25(d)
TERMULATOR (Master)	£35(d)
MAYA TERMINAL EMULATOR	£49(d)
COMMSTAR II	£28(d)

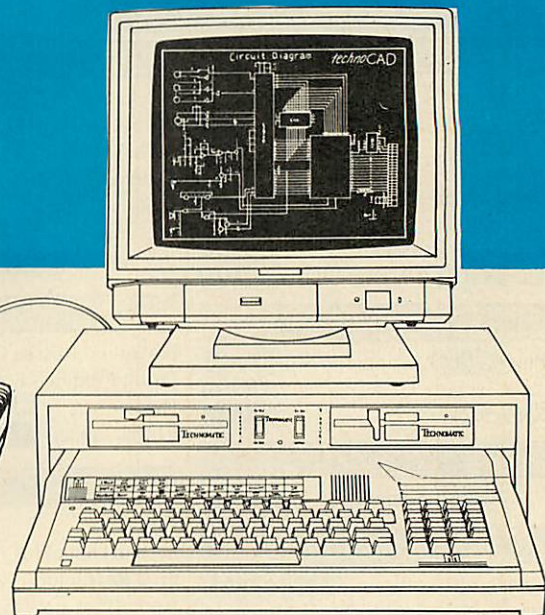
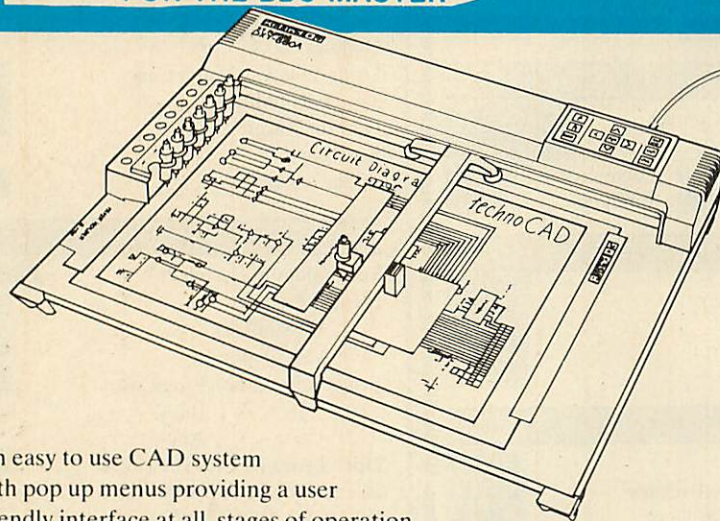


# TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

## technoCAD

COMPUTER AIDED DRAUGHTING  
FOR THE BBC MASTER



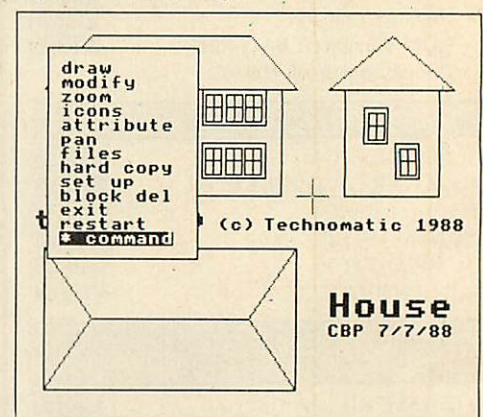
- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
- ★ Multi layering capability with 8 levels allows superimposition of drawings.
- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.

- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

**FREE EVALUATION DISC**  
**AVAILABLE**  
Phone for your copy  
**£99(c)**

### Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use. technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.



### BOOKS

No VAT Carriage Code (c)

#### LANGUAGES

6502 Assy Lang Prog .....	£10
6502 Programming .....	£8
8086 Book .....	£23.95
Acorn FORTH .....	£8
Acorn LISP .....	£8
Acorn ISO Pascal Ref Manual .....	£8
BASIC ROM User Guide .....	£9.95
30Hr BASIC .....	£7.50
Intro to COMAL .....	£8
Master Reference Manual I .....	£14
Master Reference Manual II .....	£14
Micro Prolog Ref Manual .....	£8

#### BBC MICRO GUIDE BOOKS

Inside Information .....	£8.95
Maths Prog in BBC Basic .....	£5.95

#### ARCHIMEDES

Archimedes Reference Manual .....	£29.95
Arc. Assy. Lang. Prog. ....	£14.95
Inside Autosketch .....	£12

#### PROGRAMMING/UTILITY

Advanced Sideways Ram User Guide .....	£8
Advanced User Guide (BBC) .....	£15.95
New Advanced User Guide .....	£19.95
Assy. Lang. Prog. BBC .....	£10.50
Mastering Assembly Code .....	£6.00
Mastering Interpreters & Compilers .....	£10.00
Master Operating System .....	£6.95
Mastering View, Viewsheet & Viewstore .....	£8.00
View by B. Smith Dabhand .....	£8.00
View 3.0 Manual .....	£8.00
Viewstore Manual .....	£8.00

Viewsheets User Guide .....	£8.00
Wordwise Plus .....	£5.00
Understanding Interword .....	£5.00

#### SOUND & GRAPHICS

Computer Graphics & CAD Fundamentals .....	£5.00
Mastering Music .....	£5.00

#### DISC DRIVE SYSTEMS

Advanced Disc User Guide .....	£15.00
Disc Programming Techniques .....	£7.00
File Handling on the BBC .....	£7.00
Practical Disc File Techniques .....	£4.00
Mastering the Disc Drive .....	£5.00
Mastering DOS plus .....	£9.00

#### APPLICATIONS

The Software Business .....	£2.50
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# TECHNOMATIC

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Fax: 01-205 0190

## RETAIL SHOPS

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Tel: 01-205 9558 Fax: 01-205 0190

(close to Kingsbury ↗)

West End Branch

305 Edgware Road, London W2

Tel: 01-723 0233, 01-402 0444

(near Edgware Road Tube) ↗

For fast delivery telephone

your order on 01-205 9558

using VISA/Access Card



Orders welcome from

government depts &

educational establishments

All prices ex VAT

Prices are subject to

change without notice

Please add carriage

(a) £8.00 (Courier)

(b) £2.50

(c) £1.50

(d) £1.00

## PC COMPATIBLE BOOKS

Using SMART .....	£22.45
Using Symphony 2nd Ed .....	£22.45
Advanced Techniques dBASE III+ .....	£22.95
dBASE III Plus Prog Tips/Tecs .....	£16.95
dBASE III+ Handbook 2nd Ed .....	£19.95
dBASE III+ Progmg Tips & Techniques .....	£16.95
Mastering dBASE III+ .....	£22.95
Understanding dBASE III Plus .....	£19.95
123 Tips Tricks & Traps .....	£18.45
ABC's of 123 .....	£15.95
Mastering 123 (2nd Ed.) .....	£24.95
Using 123 Special Edition .....	£21.95
Mastering Supercalc 4 .....	£17.95
Advanced Techniques Wordperfect .....	£18.95
Using Wordperfect W/Book & Disc .....	£27.45
Wordperfect Tips Tricks Traps .....	£16.95
ABC's of Word Perfect 5 .....	£16.95
Mastering Wordperfect 5 .....	£12.95
Using Wordperfect 5 .....	£19.95
Introduction to Wordstar .....	£17.95
Wordstar Prompt .....	£5.95
Introduction to Wordstar 2000 .....	£17.95
Wordstar Prof Complete Reference .....	£24.95
ABC's of Autocad .....	£20.95
Inside Autocad .....	£32.45
Inside Autosketch IBM .....	£12.50
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Ventura Tips and Tricks .....	£18.95
Turbo Basic Programs .....	£19.95
Advance C Techniques and Applications .....	£19.95
Advanced C Programming .....	£19.10
C At A Glance .....	£7.95
C Programming Lang 2nd Ed .....	£24.95
C The Complete Reference .....	£21.95
Solutions in C .....	£17.25
Turbo C Complete Reference .....	£24.95
Using Turbo C .....	£19.95
Advanced Turbo Prolog .....	£19.95
Introduction to Turbo Prolog .....	£19.95
Advanced MS DOS (Microsoft) .....	£19.95
DOS Instant Reference .....	£9.95
DOS The Complete Reference .....	£21.95
Mastering DOS Vers to 3.3 .....	£19.95
MS DOS Encyclopedia to 3.2 .....	£95.00
MS DOS Handbook (3rd Ed.) .....	£18.95
MS DOS Quick Reference (3.2) .....	£3.95
PC Magazine DOS Power Tools .....	£39.95
DOS Plus Reference Guide .....	£12.95
Understanding UNIX .....	£20.45
Understanding Unix 2nd Ed. ....	£19.45
UNIX Programming Environment .....	£21.70
Unix The Complete Reference .....	£22.95
Programmer's Guide to Windows .....	£21.95
Using Sidekick Plus .....	£21.95

## Professional Software Developers Tools for BBC Universal Development System

A set of three packages to meet the needs of any software developer for assembling, disassembling and emulating codes for over 30 processors. Packages are structured to work with new processors.

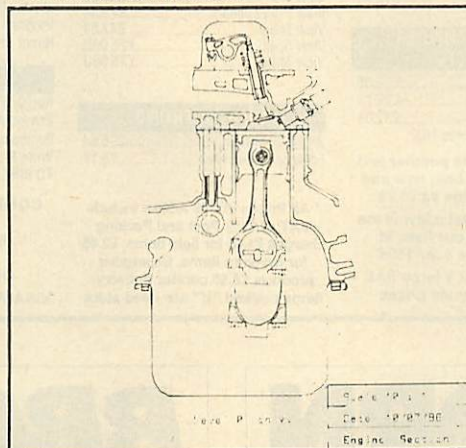
Full details on request. This is what Acorn User had to say about the assembler.

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

## NOVACAD Computer Aided Draughting System

Novacad can drive a plotter to produce drawings of highest quality...  
Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC compatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximum plotter size.

NOVACAD T/M Version  
NOVACAD T/M + Plotter DG  
Plotter Driver Generator

£49(d)

£61(c)

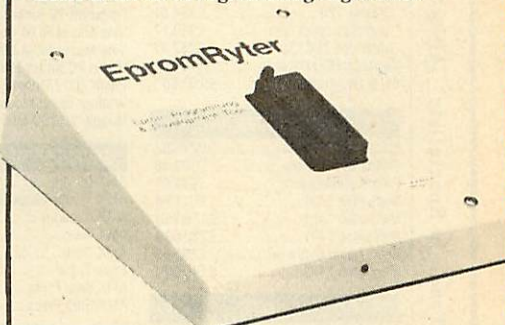
£15(d)

## EpromRyter

\*Highly sophisticated & Advanced Programmer

\*All current single rail eeproms handled

\*State of the Art Programming Algorithms



EpromRyter is a powerful eeprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eeprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

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# HINTS & TIPS

## MIRROR IMAGES

Reflect your screen in Basic, cut and paste text, get more out of your Master 512, use Screen to check View files, and more besides

**David Atherton**

### £5 REFLECTION IN BASIC

Andrew Pepperell from Louth has the *Acorn User Graphics Utilities Disc*, and is understandably impressed with the machine code routines written by my Agora colleague David Acton for reflecting certain parts of the screen. As an exercise, Andrew set out to see if he could do the same thing in Basic. The result is in the yellow pages.

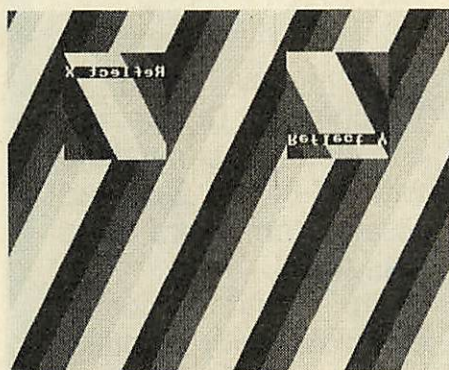
The program, which comes with a short demonstration, has two procedures, PROCreflectx and PROCreflecty. These take four arguments, being the left, bottom, right and top co-ordinates of the area to be reflected.

One procedure is called to produce a mirror-image of the screen, reflecting it left to right. The other flips the screen image upside-down.

PROCreflectx reflects the contents of the screen area defined around the X axis – a left to right mirror image. PROCreflecty reflects around the Y axis – to give upside-down pictures. The four parameters are passed to the procedure in the order given, as shown by L%, B%, R% and T% in the procedure definition.

The procedures work by taking a row (or column) of pixels, and reading in from each end and then swapping them over. This is repeated for each row (or column) until the whole block has been reflected. The step in the FOR..NEXT loops, which is set to 4 in the example listing in the yellow pages, should be altered to 2 for a mode 0 screen, or 8 for modes 2 and 5.

The program is not terribly fast, but it is completely legal, and thus will work on any BBC machine, including an Archimedes, and should even work on the various BBC Basics which are available for other computers.



Upside-down and left to right

### £5 VIEW SCREEN COMMAND

A short tip from James McBride of Muirkirk involves the use of the Screen command in View. This displays a file, correctly formatted on screen. James points out that, like Print, this command will display a file directly from disc without corrupting memory contents. So if you are working on one file, but want to look at another one, you can type SCREEN <filename>. James uses this when he's writing a document, but can't save it because the disc catalogue is full. By SCREENing the files, he can check if any can be deleted. Or you could use it to read the text – say to check on a reference to an old letter.

Another tip offered by James to achieve the same end is to permanently keep a file called V. Last on the disc, which is a dummy file that you can delete as a last resort. I use a similar system with the name 'temp', with a golden rule that if I ever save anything with the name temp, I immediately deal with it in some way, by renaming or knowing that it has no further use. My discs are littered with 'temp' files which get deleted in my !BOOT file, or overwritten by the next temp file I create.

### £10 EDIT QUICKIE

A small quickie on using Master Edit to deal with pound signs (£) in text files generated by the IBM PC, the Master 512 or Archimedes. On these machines, the ISO standard pound sign, Ascii number 163, is used.

To replace this with a BBC-compatible pound sign, load your text file into Edit, and type f3 and then CTRL-f3, followed by '£'. This will perform the replacement correctly, as CTRL-f3 happens to generate code 163.

This month's disc contains a bonus file, IBMFONT, which you can \*Exec to redefine the character set of a Master 128, or even a BBC B with a second processor. It makes the on-screen font the same as that used by the IBM PC, or an IBM-compatible printer. The set includes a number of graphics characters useful for drawing boxes.

### £15 CUT AND PASTE ROM

Yet another interesting program from Brian Ross, for the Electron and Master series only, is a cut and paste ROM. This provides a simple method of copying a block of text within any text editing or other program. It emulates the 'clipboard' facility found on computers like the IBM PC and Apple Macintosh. With this you can mark a block of text within the program, and 'cut' it out (actually 'copy' it, as the original text is not deleted) and 'paste' it back in again.

A similar facility already exists in wordprocessors such as View's 'copy marked block' option – but this program is easier to use, will cut a true rectangle from the screen (rather than an area from



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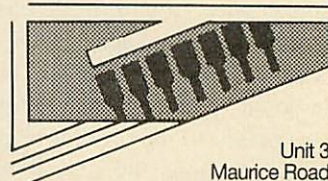
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# HINTS & TIPS

start to finish of text), and best of all, will allow you to paste the selected text into a different application, as the text is preserved when you change programs. So, for example, you could copy some text from *View* to *Wordwise*, without using a disc.

The text is kept in sideways RAM, and the program once again runs as a ROM image, so you must have sideways RAM fitted to use it. Type in the program from the yellow pages and run it; a ROM image file called 'Cut' will be created. This should be loaded into sideways RAM in the usual way, and initialised with CTRL-Break.

Then within any program, when you have text on the screen which you wish to select, press CTRL-Shift-G. An asterisk will appear at the top left-hand corner of the area to be selected – the asterisk should actually sit on top of the first character – and press Return. Then use the cursor keys again to move to the bottom right-hand corner of the rectangular area being selected. You will notice when you move the asterisk that a hash character is left behind to denote the top left-hand corner.

When you have positioned the asterisk on the bottom right-hand corner, on top of the last character to be selected, press Return again. The cursor will flash rapidly across the selected area, and then both markers will disappear, and the cursor will return to the original position it held before the cut.

The text is now stored, and you can carry on. You may wish to paste it in immediately or, perhaps, continue with other operations.

Pasting the text back into an application is much simpler. Just move your cursor to the place you wish to paste to and press CTRL-Shift-H. The text will appear at the cursor position. Note that at the end of each line of the rectangular area, the pasting routine will place a carriage return. Also, the area stored is an exact rectangular area, including spaces, and in some text editors, this may cause odd effects. The message is: to avoid embarrassing mistakes, practise before you need to do it for real.

The routine can only work with recognisable text characters. This is normally straightforward with the *View* family and *Wordwise*, but the routine will not work with *InterWord* if you are using the special 53 and 106 character

ever played. For someone weaned on text-only 'classics' such as *Philosopher's Quest* and *Shogun*, *Corruption* seems to have everything that I've ever wanted in an adventure game. In the past, I've always 'poo-pooed' the use of graphics to enhance an adventure; but now with hindsight, I can admit that it was all sour grapes. With excellent pictures to illustrate (virtually all) the locations and a parser that could probably even understand dialects(!), *Corruption* gets a 10 in my view. Well done Rainbird! Now let's have the same for *InterWord*, *InterMail* and *InterNet* to complete the set, and fish to keep us up to date with all those poor 51 and design owners.

'poo-pooed' the use of graph  
e an adventure; but now wit  
ht, I can admit that it was  
apes. With excellent picture  
ale (virtually all) the loca  
arser that could probably ev  
and dialects(!), *Corruption*  
y view: Well done Rainbird!

## Cut and paste a rectangle of text

screen modes. Also the program suffers from the same problem that the first version of *Acorn User's* own *PrtSc* program had – that characters other than those in current text colours (normally white on black) are not recognised. With the cut and paste ROM, they are converted to asterisks.

Once the text is pasted, the paste routine is disabled, meaning that the text can only be pasted back once. You could, however, alter the program so that the text can be repasted more than once. Also, the cut routine is disabled once some text has been cut – to avoid overwriting. In other words you must paste it back somewhere before you can cut again. Again this could be altered.

Further enhancements are possible such as sending the contents of the 'clipboard' to disc or printer, or even altering the text in some way. Finally take care not to press any keys other than the cursors and Return while setting up the rectangle, or these keys will get mixed in with the pasted text.

Possible uses for the program include easy transfer of *ViewSheet* and *ViewStore* information into *View*, or similar operations with the *Inter* family. Also, you can replay a series of Basic or star commands – make sure that you copy from one character in from the left, so you don't include the prompt.

Note that the program will work on the Electron and Master series micros, but it won't on the model B. This is because the key sequences required make use of the interrupt polling system provided in the Electron and Master OS, activated by \*FX22, which the model B does not contain.

The program works by initialising polling, and then at each poll, testing whether CTRL and Shift are being pressed. If so, a test is made for G or H. If G is pressed, then the cut routine is

activated. If the buffer is empty, the polling is turned off to avoid re-entry, and the cursor position and text window definition is stored. The asterisk may move freely around the entire screen, but the original cursor position and text window will be restored on exit. The key control routine then allows the top left position to be set, and then the bottom right position. These are stored in 'ulx', 'uly', 'lrx' and 'lry' respectively. The text in the block is then read, moving the cursor with VDU 31 and reading each character with Osbyte 135.

Top-bit set characters are not stored, even when they are valid defined characters, as bit 7 is used to denote that a character is the last on the line.

The end of text is marked with &FF, which cannot be confused with an end-of-line character, as &7F, the character which &FF would represent on the end of the line, is Delete. As each byte is read it is stored in the Cut buffer, which is the area in sideways RAM immediately after the program code. After storage, the original screen and cursor position is restored.

The routine move\_\_cur which controls cursor movement does not use Osrdch as this won't work inside a polling routine. Therefore the keyboard is read directly using Osbyte &7A, and delay loops are introduced to slow down keyboard repeat. These delay loops may have to be reduced on the standard Electron, or increased for a Master. Brian has set the values for his own Turbo Electron. To reduce the delay, increase the value (currently 0) of the number loaded into X at labels 'rdkdel' and 'd12', eg, LDX#128 would double the repeat speed. To increase the delay, introduce more NOP instructions at these points.

The Paste routine works after detecting the key sequence by redirecting the polling routine to fetch one character at each poll. It would not be possible to output the entire buffer during one poll, as this would take far too long within an interrupt routine.

As each character is fetched, it is decoded to see if we have reached an end-of-line or end-of-text byte.

With the former, a character 13 is inserted. When &FF is found, the paste routine is disconnected to stop further characters being output, and ordinary keyboard monitoring is restored. Unlike Cut, there are no screen windows or



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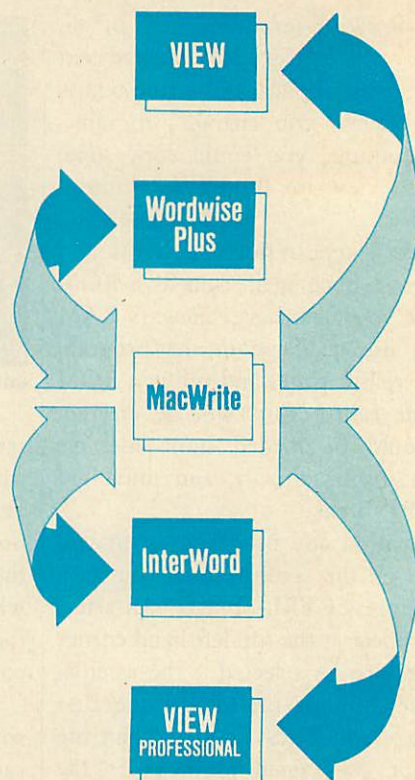
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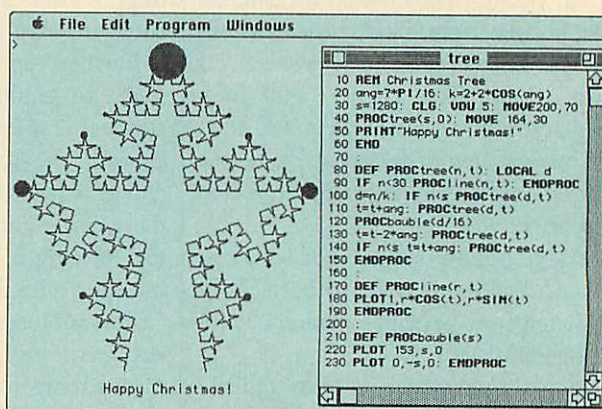
## BBC BASIC – Now available for Macintosh

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AU88/6

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## HINTS & TIPS

cursors to restore. The way Brian has written the program makes it very easy to alter the action of the Paste routine. So, for example, you could output a space rather than a carriage return at the end of each line.

**£10  
MASTER  
512 TIP**

The Master 512 is a topical subject these days, with huge numbers of the boards being sold since the price was reduced to £99. Martin Brewer of Redruth has a BBC system with a Solidisk real time clock and a Master 512 board fitted in a Watford co-processor box. He has found that the 512 software as issued can't read the time from the Solidisk clock; despite the time being available, it still has to be typed in every time. After much fiddling about, Martin has found that if a single byte is patched, DOS Plus will read the time from the Solidisk system.

The alteration that needs to be made is on the 512 boot disc. Before you start, make a backup copy of the disc, using the menu-driven disc copy program supplied with the 512, and work with the backup so that if anything goes wrong you still have your original disc. You will then need to use a BBC-based disc sector editor such as Pres's *ADT* or *ADI*, BBC Soft's *Monitor*, or the DOS-based editor in C Snee Computer Services' Master 512 Utilities pack.

Using the editor, move to track 10, sector 4, (decimal) and locate byte &86 (hex). This byte should be &03 - it appears like this:

```
0080 FF EB 32 FD 80 FB [03] 74 ..2....t
```

Change the byte to &01, and resave the sector back to disc. Now reboot the Master 512 using the disc you have altered. You should now find that the computer no longer asks for the date and time, but enters DOS with the correct date and time set by the Solidisk clock. Typing Date or Time as DOS commands will confirm this.

Solidisk has discontinued its clock. Martin doesn't say whether this also works on the *Genie Watch* system from PMS, which is the only real time clock now available. As the *Genie Watch* supports the standard Osword calls, I see no reason why it should not.

Another tip for Master 512 users

concerns the use of function keys while in DOS. On normal PCs, the f3 key repeats the last DOS command typed, the f1 key repeats individual characters, and f6 outputs an End-of-File character. On the Master 512, these useful features are not available when the system boots; various keywords appear when function keys are pressed.

However, if you load a second copy of the COMMAND.COM file – the program which actually handles DOS input – then the standard IBM definitions are available. To do this, simply type COMMAND at the DOS prompt, with disc 1 in the drive.

Note however that this uses up about 27k of DOS memory, and so some programs may not run correctly.

**£5**  
**MASTER 512**  
**MONITOR**

[illegible]

**\*HELP MON gives these commands**

While on the subject of the Master 512, Friso Dijstelbergen of Eastbourne, New Zealand, reminds those who didn't know that there is a built-in memory monitor in the Master 512 ROM. If you start your 512, and press Break when DOS is loaded, the screen should clear and report the standard second processor message, and filing system, and give you a star prompt. You can also just type \*Configure Tube, and press Break without a DOS disc loaded. If you now type \*Help Mon, a list of commands will appear. These are 'd' to dump a block of memory (like \*Dump), 'f' to fill memory, 'go' to execute \*Go, 's' to edit memory using the cursor keys, 'sr' to search for a string, and 'tfer' to transfer memory between the 80186 and the 6502. An additional command \*Dos loads DOS Plus from the boot disc without the need to press CTRL-Break. There isn't room here to describe how to use the functions

for 80186 programming, but clearly there is a lot to explore here. The syntax of each command is given in the help messages. If you are new to 80186 memory mapping, you can start exploring using `*S 0000:0000`.

**£5**  
**SHORTER FUNCTION**  
**KEY PROGRAMS**

JP Jakubovics of Oxford has written to me to explain how the various one-line Basic programs that have been covered over the last couple of months could have been stored more efficiently by entering the coded 'token' for each Basic keyword. So if you want to program a key with the command PRINT TOP-PAGE to find the length of your current Basic program, then typing \*K.O.P.TOP.PA.M is certainly shorter at 10 bytes. But \*K.O.q!8P-!PM achieves the same effect using six bytes, because the single byte tokens (TOP is the token for TO, plus a P) replace the two to three byte abbreviations. The \*Key command decodes the coded GSREAD sequences when you enter them, compressing for example !q into a single byte, value 241, the token for PRINT.

Of course it is difficult to remember the numbers and to read codes appropriate to the tokens. But there is an easy way to program keys in this fashion, using the interpreter itself. Type in the line of code you wish to assign to a key as the first or only line of a program, ie, `10PRINTTOP-PAGE` using as compact a form as possible, omitting spaces where you can — you don't have to use abbreviated forms though. Then to assign this line to `fo`, type: `OSCLI ("Key o"+$(PAGE+4)+"M")` The key will be assigned and you can now delete the program line. Pressing `fo` will produce a strange set of characters on screen, but it will work, and the length of the current Basic program will indeed be printed out. This works because the text of the first line of a Basic program is always stored (in tokenised form) at `PAGE+4`. And as each Basic line ends in a carriage return, the string indirection operator `S` correctly picks it up.

*All submissions - hints, tips, programs or simply ideas - should be sent to Hints and Tips, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*



# ARC AGORA

## BACK UP YOUR TROUBLE

An example of how to archive a hard disc  
and a module for finding pathnames

**David Acton**

Those of you who glanced over the Abuser page last month may have heard the sorry tale of my hard disc.

Alas, my replacement disc is going through the same difficulties, but not before I had finished the hard disc archiver program which forms the bulk of this month's column.

In fact, listing 1 on the yellow pages is not just for hard disc owners – network users might also find it useful for storing data away on floppies.

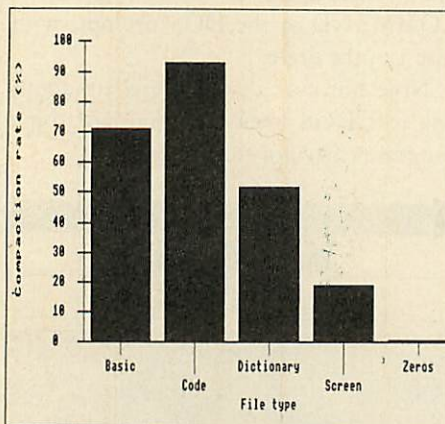
There are two main problems with making backup copies of hard disc files. First, the sheer quantity of data stored on a hard disc is often enough to fill over twenty 800k discs and this brings to light the problem of which files to put on which discs. Second, very long files may be stored on a hard disc or network; if a file grows beyond 800k it clearly cannot be copied onto a single floppy disc – it must be split into parts manually. Listing 1 gets around these two problems using a tried-and-tested technique.

The idea employed is to combine all of the files being archived into a single giant file – spread over as many discs as possible. You are prompted to insert a new blank disc when needed, and these are numbered sequentially so that recovery of files is made easier.

Once I'd written the simple form of the archiver it seemed a shame not to use the immense processing power of the Archimedes to 'squash' the data so that fewer floppies are required. My guess is that discs are especially valuable commodities in schools and colleges.

On a trial run, the finished listing 1 reduced the size of a mixture of files from two megabytes to just over one – this has a potential saving of 12 discs when archiving the contents of a full 20Mb hard disc drive.

Once you've typed in listing 1 (or



Compaction rates of typical file types

bought it on the monthly disc), run the program and you'll be presented with a simple menu. Press 'A' to archive a directory onto floppies, 'R' to recover a previously archived directory or 'Q' to quit the program.

On selecting 'A' you'll be asked which directory you wish to archive. By default this is 'adfs::4.\$' – that's the root directory of most people's hard discs. To back up your network you might delete the default name and enter "net:\$" instead. You should be able to archive a directory from anywhere (other than the drive you are storing the copy on). To permanently change the default name simply alter the first line of the definition of PROCarchive. Next you will be prompted for the number of the floppy disc drive to which you wish to archive – 'o' by default.

Finally you will be asked whether you wish the data to be compacted. Answering 'Y' will probably reduce the number of floppy discs required and will not alter the files in any way. However, even the Arc takes a little time to compact files so press 'N' if you have plenty of discs and are in a hurry! You will then be asked to insert a fresh disc at the start of the proceedings and periodically during the

archiving process. If the disc you insert is unformatted you will be asked if you would like it formatted – press 'Y' if you are sure. Note that discs are always formatted as type 'D' (800k) although you may use pre-formatted 640k discs if you like.

If there are any files on the disc you insert, you will be asked if they may be deleted. If not, press 'N' and insert a blank disc instead. The program only allows you to archive onto empty discs.

As the files and directories are encountered their names will appear on the screen, indented to indicate the directory structure. If a file has been compacted, the compaction rate is shown as a percentage in brackets after the filename. If a file cannot be archived for any reason (a hard disc error for example) an error message will be shown. Depending on the error, this may invalidate the backup – please check any such files and delete them if they are unwanted.

You will be told when the archiving process is complete, and the menu will be shown again. Make sure to number your discs in the order they were used.

To recover an archived directory, selected 'R' from the menu and insert the first disc of your archive. Press Return and, if the disc is valid, you will be told when the archive was made. You will also be given (as default) the original directory name (adfs::4.\$).

If you wish to put the files back in a different place, simply delete the name given and enter your own. You will be prompted to insert discs periodically. Each disc is labelled by the program, so if you accidentally insert the wrong disc you will be asked again. Note that the recovery will fail if a file of the same name as one being retrieved already exists and is locked. Enthusiastic readers might like to embellish the program to



get around this feature; lazy readers should just unlock or delete such files if they dare.

Archiving is performed by PROCarchive and recovery by PROCrecover. A simple, recursive approach is used to trace a path through the tree of files and directories. All available memory is used for archiving and it's divided into two equal areas. One is loaded with original data, the other receives compact data where appropriate. The particular approach used means that files can only be compacted if they fit entirely into one of these blocks of memory.

If you ever encounter the error 'Insufficient workspace' when recovering files, it means that Basic hasn't as much memory to use as it did when the archive was made. In this case, you'll need to reconfigure the machine appropriately – reducing ScreenSize, SpriteSize and so on to whatever they were before.

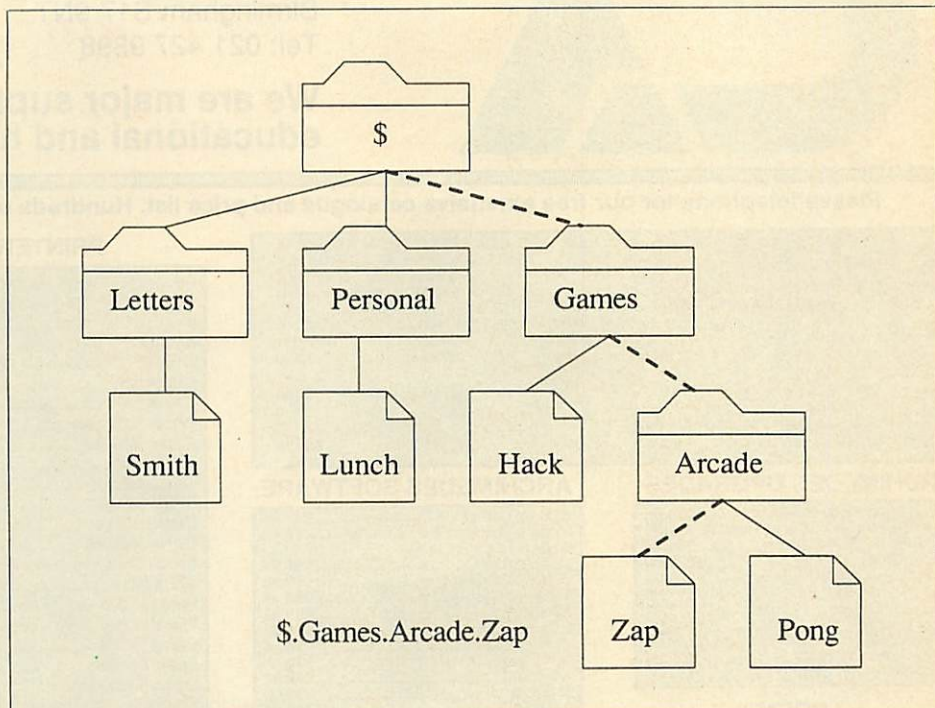
The compaction system used is one of 'common strings'. Typically, text files are compacted by looking for common strings such as 'ing', 'tion' or 'the'. But our archived files may be of any type – not just text but Basic programs, machine-code or data of some other kind.

You cannot rely on specific English sequences of characters. So, instead, the program looks back in the file being compacted to see if the characters coming up have been used before. In fact it checks the last 256 characters for a similar sequence. If it finds one, it is encoded as two or three bytes of information depending on the length and location of the repeated characters.

This process takes some time, but it is performed by the machine-code routine .comp for maximum speed. Expansion is much more rapid and is taken care of by the routine .expand.

The diagram opposite illustrates the compaction rates of several examples of typical file types. A file consisting entirely of zeros obviously compacts the best, to about 10 per cent of its original size. A machine-code file I tested went down to 93 per cent which is 7 per cent better than nothing.

For those interested, the archive file format is fairly straightforward. Each file 'segment' is called '\$.Backup' and begins with an 'archive name' string. This consists of the time and date of the archive followed by '/' and the disc's number in the archive sequence. Objects



It's easy to see the complete pathname of the Zap file by following the dotted line

are preceded by a code byte: 1 for a file, 2 for a directory and 3 for the end of a directory. The last '\$.backup' file is terminated with a 255.

After a code byte of 1 or 2 comes the file or directory name. In the case of files, this is in turn followed by 16 bytes of file information (date stamp, attributes etc) and then a compaction byte: 0-uncompacted, 1-compacted.

Uncompacted files follow this byte immediately while compacted data is always preceded by a four byte value which indicates the length of the file in its compressed form.

There are many ways in which you might like to enhance listing 1. It would be nice just to be able to archive a single file, or output the combined data to a file other than '\$.Backup'. This latter idea might be employed prior to sending the data via electronic mail for example. I use a similar program on a model B to compact data sent via SJ Research's InterSpan system. If you do come up with improvements of your own, do send them in to Agora.

## PATH FINDER

Once again we've just got enough room for a David Lawrence quickie – you'll find it appears as listing 2 on the yellow pages. If you've ever managed to get lost in your own directory tree this listing

could prove to be your only means of escape. The program assembles a module (which, for purely historical reasons David has called 'BroomCupboard'). This module supports the single command \*PathName.

Typing \*PathName by itself will display the full pathname of the current directory – appending a directory name will then take you into that directory and show its full name.

Those of you unfamiliar with modules might like to look back at previous Agora pieces on the subject. The main pathfinding code starts at .path.

The pathname is built up by reading the current directory name and then issuing a \*Up command until the \$ directory is finally reached.

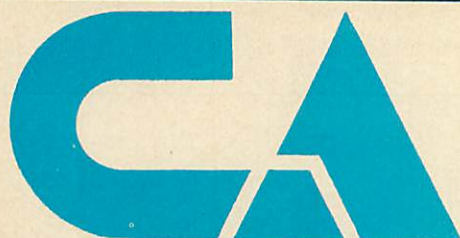
The SWI call "OS\_GBPB" with Ro=6 provides you with the directory name and then you can use the same call with Ro=5 to return the disc name to finish the job off properly.

Finally, you are returned to the directory shown using "OS\_FSControl" (that's the call used by \*Dir).

The BroomCupboard module is a good example of how to claim workspace for a module. It needs 512 bytes of workspace in which to build the pathname.

Please send your programs, ideas, hints and tips to: Arc Agora, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Published items can yield up to £20 for their creators.





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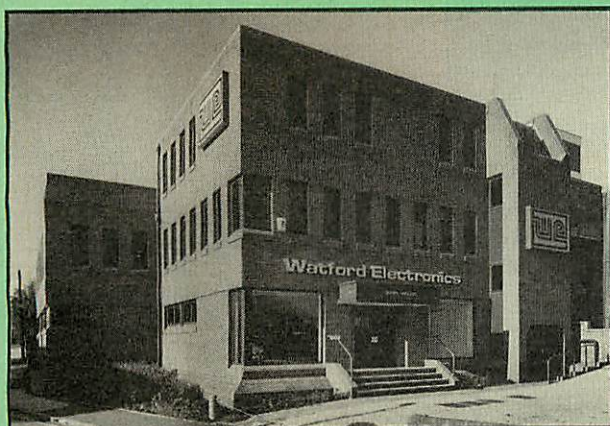


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### ACCESSORIES

● NEW Multitasking RISC OS	£29
● 0.5 Mb RAM for 305	£139
● ROM Podule Acorn	£56
● ROM Podule (Computer Concepts)	£45
● ROM Podule (C.C.) with Battery Backup	£59
● 2 Podule Backplane + Fan (Acorn)	£37
● 2 Podule Backplane (Watford)	£25
● 4 Podule Backplane (Watford)	£38
● Backplane FAN only (for Hard Disc)	£9
● 2nd 800K Floppy Drive (305/310)	£118
● I/O Podule (with Analogue port, User port, & 1MHz bus)	£80
● MIDI add-on to I/O Podule	£37
● MIDI Expansion Card	£65
● Sound Sampler (Armado)	£104
● Chromalock Podule	£280
● 20 Mb Hard Disc & Controller Card	£469
● Watford's latest 20 Megabyte Hard Disc, Controller Card & Utilities Software	£379
● Econet Network Board	£40
● Archimedes IEEE Interface Adaptor	£269
● Dual RS232 Podule	£195
● 16 bit parallel I/O Card	£195
● PC Emulation Pack incl. MSDOS 3.21	£65
● Archimedes Reference Manual	£29
● Artm Assembly Lang. Prog. Manual	£12

### WORDPROCESSORS

Wordwise +	£18	Pipedream	£89
Image Writer	£25	P. Spellchecker	£48
Interword ROM	£35	View	£49
1st Word Plus	£75	Viewspell	£32
Archie Spell Master	£49	ViewIndex	£12

### DATABASES

AlphaBase	£39	Flying Start II	£80
Viewstore	£49	System's Delta +	£60

### SPREADSHEETS

Intersheet ROM	£35	Viewsheets	£49
Sigmasheet			£59

### BUSINESS GRAPHICS

GammaPlot	£59	Interchart ROM	£25
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### INTEGRATED PACKAGES

Logistik - Database, Spreadsheet, Time Management & Business Graphics

£94

### GRAPHICS, ART & DESIGN

Artisan	£31	Gamma Plus	£60
Pro Artisan	£140	Graphic Writer	23
Support Disc	£16	Autosketch	£69
Toolkit (Beebug)	£32	Toolkit (Clares)	£31
Arc Termulator	£56	Zarch	£16
Alerian	£12	Conquerer	£20
Minotaur	£11	Missile Control	£13
Kermit	£46	Enthar Seven	£29
Archeffect	£20	Arc PCB Designer	£82
ArcTFS	£25	Linguinity	
		Presenter	£24

### Computer Concepts' Archimedes Software on DISC

Inter-Word Disc	£27	Inter-Sheet Disc	£27
Inter-Chart Disc	£17	Spell-Master Disc	£48

### LANGUAGES

ANSI 'C'; ISO-PASCAL; FORTRAN 77;	£94 each
Cambridge LISP; PROLOG X	£181 each
LOGOTRON LOGO	£55
BASIC Compiler	£89
Archimedes Assembler	£189
TWIN EDITOR	£27

### MINERVA's Archimedes Software

Sigmasheet	£57	Gammaplot	£57
Deltabase	£24	Sys Delta+	£57
Sys Delta + Ref Manual			£25
Order Processing*	£53	Sales Ledger*	£53
Stock Manager*	£53	Purchase Ledger*	£53
Nominal Ledger*	£53	Reporter	£20
School Administrator			£66

\* Requires System Delta

### Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

Only £15

### Archimedes 5 1/4" / 3 1/2" Disc drive Interface

With this interface it is possible to connect almost any 5 1/4" / 3 1/2" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

New

### Watford's 20Meg Archimedes Hard Disc

Watford Electronics' 20Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). The price includes the Hard Disc Drive, Controller Podule & fitting instructions. P.S. This upgrade requires a backplane and a fan.

Type Arch-HD20	£379
Backplane for 2 Podules	£25
Backplane for 4 Podules	£38
Slitline Quiet Extractor Fan	£9



CREDIT TERMS now available.  
Please telephone or write in for  
further information.

### BBC MASTER

MASTER 128K Micro incl. Acorn's: View, Viewsheets, ADFS, BASIC Editor & TERMINAL plus £35 worth of FREE OFFER (see below) **£345**

### FREE ... £35 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control. With every BBC Master purchased from us this month.

BBC MASTER with Turbo Board + above SPECIAL OFFER **£474**

512K Processor Add on Board "inc. Mouse and GEM package" **£119**

BBC MASTER plus 512K 80186 Co-processor Board (incl. Mouse and GEM package) plus the above £35 worth of SPECIAL OFFER **£475**

Securicor Carriage on Micros £7

### ADD-ONS & ACCESSORIES

Turbo 65C102 Add-on Module	£118
Econet Module for the Master	£40
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref. Manual	(No VAT) £18
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£49
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
ARIES' Professional IEEE Interface	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S	£899
Filestore E40s	£799
Filestore E60S	£1080
Ecolink	£270

### BBC MASTER COMPACT

System 1	Standard Package	£305
System 1A	System 1 + TV Modulator	£329
System 2	System 1 + Green Hires Monitor	£359
System 3	System 1 + Medium Res Colour Monitor	£469
RS232 Kit for BBC Compact		£25
Additional 3 1/2" Drive for BBC Compact		£90
	(Securicor carriage £10)	

### VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

### ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only £10 (£2 carr.)

Continued



## CO-PRO Adaptor



With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K add-on your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro Adaptor to add a second Co-processor externally.

Watford, brings power to your BBC at only:

**£35 (carr £5)**

**Watford Electronics are  
Appointed & Authorised**

**DEALERS / REPAIR CENTRE**

**for Acorn Computers Ltd  
Cambridge Computers Ltd  
Microvitec Monitors  
Panasonic Printers**

## Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32 (carr £2)**

## 65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

**£159**

**By Popular demand we are now  
supplying refurbished and fully  
guaranteed BBC Micro Model B with  
Disc Filing System**

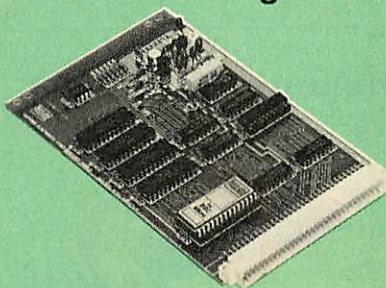
(Please telephone for price & availability)

## The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

**New low price £219**

## Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squashed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

## SPECIFICATION

### SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing - pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers - pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, averaging, subtracting, multiplication etc.
- Much faster versions of the Arthur \*ScreenLoad and \*ScreenSave commands.

Software facilities are accessed via operating system star (\*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

### UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screen-dumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

### RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2, 16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

Cont.

### SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

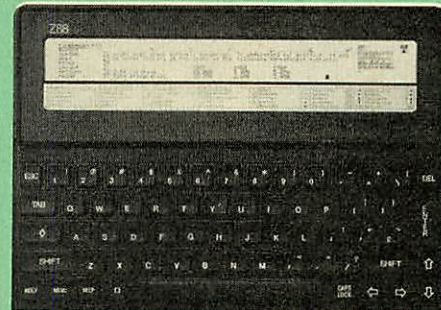
### HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

**Price £249**

## Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

**Only: £239**

### FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

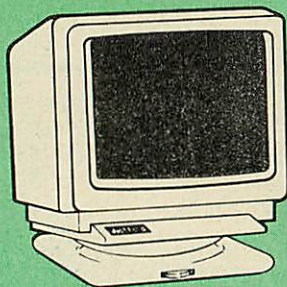
### ACCESSORIES

Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K EPROM Pack	£43.40
512K RAM Pack	£169
Z88 Spellmaster for Pipedream	£51
Z88 to BBC Link	£21.70
Z88 to PC Link II	£30
Z88 to Macintosh Link	£49
Z88 EPROM ERASER	£34.75
Serial Printer Cable	£8.65
Parallel Printer Cable	£24.00
Z88 Modem	£145
Z88 Soft Carrying Case	£8.50
Sinclair Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger, Compact & Fast (3 Hours)	£6

**Continued**



## MONITORS



All Monitors are supplied complete with BBC connecting leads FREE.

## MICROVITEC 14"

- 1431 - Standard resolution as used on the BBC television computer programme £175
- 1451 - Medium resolution, suitable for word processing in mode 0 £219
- 1441 - High res, exceeds the capabilities of the BBC micro £359
- 1431AP RGB + PAL and AUDIO £199
- 1451AP RGB + PAL and AUDIO £255
- 2030 CS 20" Med Res £380
- 2040 CS 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- Touchtec 501 Touch Screen £239

## TAXAN 12"

- TAXAN Super Vision 2 Type 620 Hi-res RGB Colour, Green/Colour Switch £265
- TAXAN Super Vision 3 - Type 625 Super Hi-res RGB Colour, Green/Colour Switch £315

## 14" MULTISCAN COLOUR

- TAXAN Multisync 770 Plus £449
- EIZO Flexscan 80605 - For technical info, read the review in Micro User, Jan. '89 £459
- NEC JC-1402P - Multisync II £456

NEW

## Aries 1458 14" Multisync

Aries 1458 is a state of the art, stylishly finished, flat screen, Enhanced Multiscan Colour Monitor. An auto-switching device changes modes without having to adjust the monitor (it also works in monochrome). Its wide frequency range (15-45KHz) and multi-colour display allows increased options and flexibility. 0.31mm dot pitch. Input Signal: TTL/Analogue, H-Sync 15-45KHz; V-Sync 47-100Hz; Bandwidth 35MHz; Resolution 800 x 600 Hi-resolution Multi colour Display; Display Colours CGA-16, Mono-Green (3 levels); EGA 64, Analogue - limited only by the video display adaptor; Built-in tilt and swivel base.

(FOR IBM PCs & Compatibles ONLY)

Launch offer £349

## PHILLIPS

- BM7502 12" Hi-res Green Monitor £65
- CM8833 14" Med. Res Colour Monitor £219

## STAR BUY

- PHILLIPS 14" Medium Res, dark glass, attractively finished Colour Monitor - supplied complete with RGB, SKART and Audio/Phono inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require)

ONLY £199

Dust Cover for Phillips Monitors £6

## SPARE LEADS

- BNC Lead for Zenith or Philips £3
- Skart Monitor Lead £5
- RGB lead for TAXAN Monitors £3
- Archimedes Colour Monitor Lead £7.50

&amp;

## SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing on the left), you can easily adjust the monitor viewing angle.

for 12" Monitors £8 (carr. £2.50)

for 14" Monitors £12 (carr. £2.50)

## Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

£12

## TAXAN KP-815 PRINTER

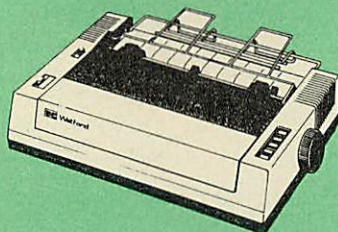
80 column, Bi-directional, 160 CPS, (NLO 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

## Offer Price £155

Taxan KP915 132 Column Printer  
£275 (carr £7)

- RS232 Interface £49
- RS232 Interface with 2K Buffer £69
- RS232 Interface with 16K Buffer £89

## Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLO mode. Character width range from 5 cpi to 17 cpi. Up to 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

WINTER SALE OFFER only: £139

Optional RS232 Interface: £39

## PANASONIC PRINTERS

- KX-P1124 24pin 80col. 192/63 CPS £349
- KX-P1180 9pin 80col. 192/38 CPS £169
- KX-P1540 24pin 80col. 240/80 CPS £449
- KX-P1592 9pin 136col. 216/45 CPS £295
- KX-P1595 9pin 136col. 288/61 CPS £409
- Panasonic KX-P4450 LASER PRINTER Latest technology at Watford's special offer price £1,540
- Spare Toner £29 ● A4 Feeder £55

## PRINTER LEADS

- BBC Centronics 4' long £5
- BBC Centronics 6' extra long £7
- Compact's Special Centronics Lead £7
- Archimedes Printer Lead 1 meter £6
- IBM Parallel Lead 1 meter £6
- Double Ended 36 way Centronic Lead 4' £7
- Double Ended 36 way Centronics Lead 6' £9
- MSX Centronics Parallel Lead 4' £12
- RS232 Leads (Various) P.O.A.

## RS-232 GENDER CHANGERS

- Male to Female £4.95
- Male to Male £4.95
- Female to Female £4.95

## INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer £515
- Paper Roll £6
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW - Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

## NEC P2200 PINWRITER

24 pin; 80 column; 168CPS - 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £269

- Pinwriter Serial Interface (optional) £55
- P2200 Cut Sheet Feeder £65
- Additional Font Cartridge £25
- NEC P2200 Pinwriter Ribbon £6

## NEC PINWRITER P6/P7 Plus

The Ultimate 24pin matrix Printer for Business.

- P6 Plus 80 columns £439 P7 Plus 136 columns £575
- Colour Option £74 Serial Interface £73
- Cut Sheet Feeder £125

- Star LC10 £175 LC10 Colour £215
- Star LC24-10 £279 NB24-10 £399

Brother HR20 DaisyWheel Printer £339

## EPSON PRINTERS

- EX800 £405 LQ850 £430
- EX1000 £564 LQ1050 £570
- FX850 £315 LQ2550 £925
- FX1000 £425 LQ2500+ £839
- FX1050 £439 LX800 £175
- LQ500 £275 SQ2500 £975
- GQ3500 Laser £1150

## PLOTTERS

- Hitachi 672 Colour Plotter £475
- Plotmate Plotter A4S £379
- Plotmate Plotter A3M £549

## CUT SHEET FEEDERS for

EX800 £149; EX1000/LQ2550 £210; FX800 £149; FX1000 £179; LQ/LX800 £139; LQ500 £75; LQ850 £135; LQ1050 £175.

## TRACTOR FEED for

EX800/1000 £85; LQ800 £44; LQ850 £69; LQ1050 £85; LQ2500 £195

## ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £18
- LQ2500 Colour Option £65

(Securicor Carriage on Printers £7)

## EPSON PRINTER INTERFACES

- All these interfaces fit inside the printer.
- RS232 £32 RS232 + 2K Buffer £52
- IEEE 488 £40 RS232 + 8K Buffer £79

## Universal Printer Sharers/Changers

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables. (Ideal for School environments.)

- | Connects | Serial | Centronics |
|----------|--------|------------|
| 2 to 1   | £20    | £22        |
| 3 to 1   | £27    | £30        |
| 5 to 1   | £36    | £39        |

(Cables extra at £5 each. Please specify type required when ordering)



## Listing Paper (Perforated)

● 1,000 Sheets 9½" x 11" Fanfold Paper	£7
● 2,000 Sheets 9½" x 11" Fanfold Paper	£12
● 1000 Sheets 9½" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1000 Sheets true A4 Fanfold Paper	£11
● 2000 Sheets true A4 Fanfold Paper	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

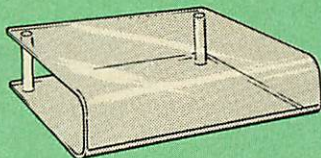
## PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

## Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments i.e. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

tions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)

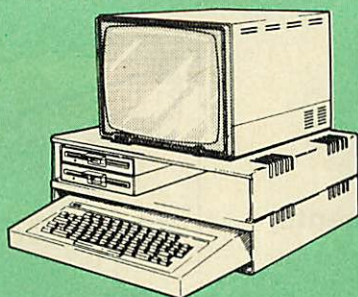
132 Column version £26 (carr. £3)

## PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	—	£3.50
BBC Master	—	£4.00
Archimedes Micro pair	—	£9.00
IBM PCs pair	—	£6.00
Brother HR15/20	£3.00	£5.00
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	£4.95
RX/FX100/1000	£5.75	—
Kaga/Taxan KP810/815	£4.90	£4.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet	—	—
Cartridges (set of 4)	£9	—

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	£12 (carr. £2)
Double BBC Plinth	£20 (carr. £3)
Printer Plinth	£12 (carr. £2)
Single Master Plinth	£13 (carr. £2)
Double Master Plinth	£24 (carr. £3)

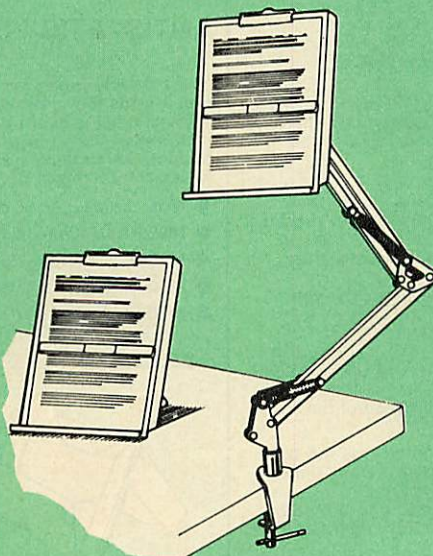
## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete  
Special Offer £18

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top £10 (carr. £3)  
Angle poise £14 (carr. £3)

## MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world 38mm x 130mm x 134mm.

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £5)

## OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: £119

BBC Screen Dump	£10
Colour Ribbon	£6
Black Ribbon	£6

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities - he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)



CREDIT CARD 24 HOUR  
Ansaphone Hot Lines  
(0923) 50234 or 33383

Continued



## DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65**

Price includes 3 Cables

### NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

### WATFORD's & ACORN's DFSs

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)*

- DFS Manual (Comprehensive) (no VAT) **£6.95**  
(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).
- Watford's sophisticated DFS ROM only **£16**
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only **£12**
- DNFS ROM only **£17** ● ADFS ROM only **£25**

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

**NEW**

### Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

### DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**  
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£123** (£7 carr)  
(Offer valid while stocks last)

### 3 1/2" DISC DRIVE OFFER



These top quality 3 1/2" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drive), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- CLS35 400K Unit **£69**
- CLD35 800K Unit **£126**

### Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

### DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

### FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3 1/2" & 5 1/4", please specify.

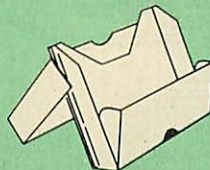
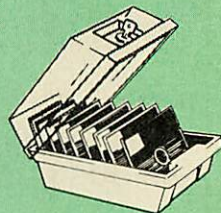
**£4**

### ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 – holds upto 50 5 1/4" discs **£4.95**
- M85 – holds upto 95 5 1/4" discs **£6.95**
- M25\* – holds upto 25 3 1/2" Discs **£4.95**
- M50 – holds 50 3 1/2" Discs **£6.50**
- M10 – holds upto 10 Data Cartridges **£15**

\* Not lockable



### PLASTIC LIBRARY CASES

Holds up to 10 5 1/4" Discs. **Only £2.00**

### DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5 1/4" Discs.

Protection at Only: **£2**





## Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

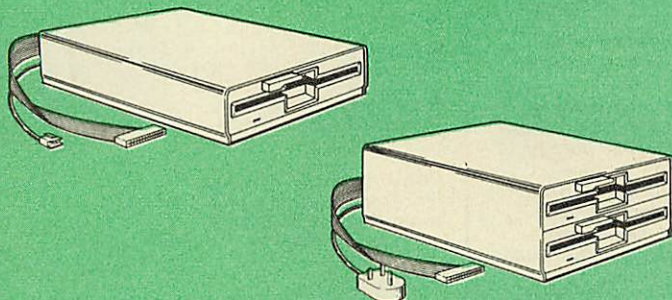
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today!)

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space! your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 5th page of our advert for the Plinths). P.S. All our 5 1/4" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

### Our Disc Drives conform to BS415



### "Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £79	CLD 400 £168	CS 400S £89	CD400 £188
800K (1.44M)		CLD 800S £159		CD 800S £179
● TWIN Disc Drive Case, complete with Power Supply & Cables £43 Securicor carriage on Disc Drives £5 to £6				

Prefix C = Cased Drive  
L = Less PSU  
S = Single  
D = Double

Suffix S = 40-80 Switchable

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5 1/4" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5 1/4" Disc Drives to BBC Compact  
Single £9 Twin £12

Special Cable to connect both 3 1/2" and 5 1/4" Disc  
Drives simultaneously to the BBC Compact £13

## 3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● 10 × 5 1/4" S/S D/D 40 Track Diskettes (744)	£6.00
● 10 × 5 1/4" D/S D/D 40 Track Diskettes (745)	£7.00
● 10 × 5 1/4" S/S D/D 80 Track Diskettes (746)	£11.50
● 10 × 5 1/4" D/S D/D 80 Track Diskettes (747)	£11.00
● 10 × 5 1/4" 1.6M D/S D/D High Density Discs for IBM XT and AT	£16
● 10 × 3 1/2" S/S D/D 40/80 track Discs	£10.00
● 10 × 3 1/2" D/S D/D 40/80 track Discs	£11.75
● 10 × 3 1/2" High Density Diskettes	£25

## TOP QUALITY 3 1/2" & 5 1/4" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● 10 × M3 3 1/2" D/S D/D 80 Track Discs	£11
● 10 × M9 3 1/2" Double Side High Density	£25
● 10 × M4 5 1/4" S/S D/D 40 Track Discs	£5
● 10 × M5 5 1/4" D/S D/D 40 Track Discs	£7
● 10 × M7 5 1/4" D/S D/D 80 Track Discs	£9
● 10 × M8 5 1/4" D/S H/D Hi-Density Discs	£14
● 3" Double Sided Discs	£2.50 each

## Special BULK OFFER on 5 1/4" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)  
(Lifetime warranty on Discs)

### BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48



## WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

- 10 Megabyte £350; ● 30 Megabyte £405  
(Securicor Carriage £9)

## CDP800S

## CDPM800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £182

CDPM 800S for Master £185

DP35-800 for BBC/Master £169

(For DP35-800S spec. see Page 13 of our advert)

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued →





## QUEST MOUSE MkII

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

## QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

## SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

## FREE

With every QUEST MOUSE package purchased from us this month, we are giving away absolutely FREE our QUEST FONT DISC software pack.

### A&B Computing June '87

"... Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, 'this is a very special mouse driven drawing package...'"

"... you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias - a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro..."

"Quest Paint is a major leap forward in BBC programming..."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

### Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest..."

"... this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus..."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX	
Stop Press & Pagefont	£89
Quest Mouse II only	£26
Quest Paint Software only	£34
Quest Font Disc	£15
Quest Mouse Mat	£3
Part Exchange your unreliable AMX	
Mouse for a Quest Mouse for only	£22
GXR ROM for the BBC Micro	£22
(P.S. Quest Paint is not compatible with BBC Compact)	

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

# ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them. Some of the features are:

- Pick filenames off the screen for loading and saving.
- Rotate a cutout to any angle and Distort it to any four sided shape.
- Has Built in Font editor.
- Default brushes and patterns on startup.
- 16 x 16 font available on start up.
- Ability to reset patterns, fonts and brushes to default at any time.
- ROM based enhanced Epson and compatible printer dump.
- ROM based enhanced extended picture routine.
- Ability to create and abort extended pictures.
- Improved disk access speed for extended pictures.
- User definable sideways RAM driver for incompatible sideways RAM systems.
- Ellipses at any angle on Master 128 (or B with GXR ROM).

### ConQuest ROM Package

£30

(Price includes software in ROM and a comprehensive Manual).

(Not Compatible with BBC Compact)

## MARK II LIGHT PEN



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)



## RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible) £45  
RB2 including Quest Paint £75

## FLEET STREET EDITOR

Software pack for BBC Micro £33  
Software pack for the Master £39  
Software Pack for Compact £40  
Admin Xtra Disc Utility £13  
Walt Disney Disc Utility £13  
Fonts N Graphics Disc Utility £13

## THE NEW Mk III AMX MOUSE

**ONLY: £59** Inc. Super Art package  
(carr £3)  
(Please specify for BBC, Master or Compact)

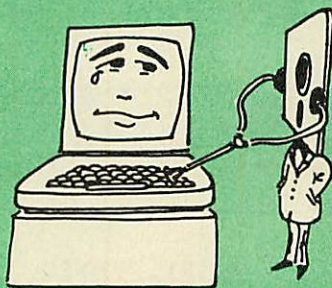
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT £3  
AMX MOUSE ONLY £29  
AMX UTILITY Package £11  
AMX SUPERART Package £34  
AMX STOP PRESS - A Desktop publishing software. Works with Keyboard, Joystick or a mouse £32

PAGE-FONTS - Over 20 Fonts for use with AMX Pagemaker £12

AMX DESIGN (ROM) £55  
AMX XAM Educational £15  
AMX EXTRA EXTRA £16  
AMX MAX A gem of desktop (ROM) £15

## DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

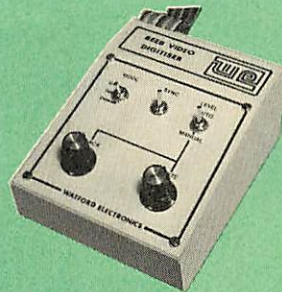
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## BEEB VIDEO DIGITISER



"Test Bureau Approved for  
Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional \* commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced 'contouring', resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual  
(BBC B+ and Master compatible, except Master with Econet)

## Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters - in fact anything that needs to be created on A4 size paper.

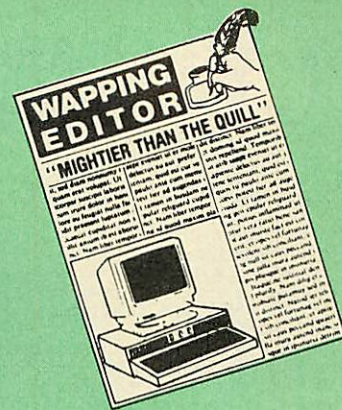
With Stop Press's many features, a variety of pictures can be composed - the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

**Complete Package £135.00 (carr. £3)**



Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

## GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

## WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands - these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

## PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space - it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

## THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Paint may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint. This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor Launch Offer: **£69**  
Wapping Editor with  
Quest Mouse **£89**

Continued





## ARIES CORNER

### B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved \*FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

### Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**  
Aries B-12C **£5**



**CREDIT CARD 24 HOUR**  
**Ansaphone Hot Lines**  
**(0923) 50234 or 33383**

### ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

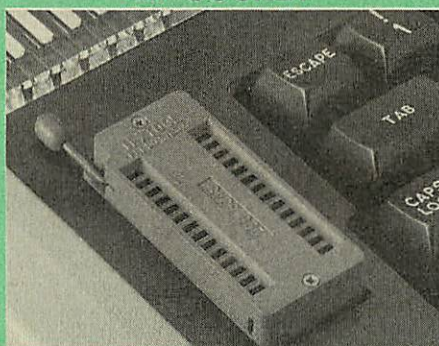
**£238** (Carr £3)

### EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only **£78**

### SIDeways ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

**ONLY £18** (carr £3)

### Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System **£11**  
● Spare Cartridges **£2.50**  
● Spare Rack **£1.50**

**ROM Cartridges for the BBC Master**  
Twin **£8**; Quad **£12**

### 16K DISC RAM

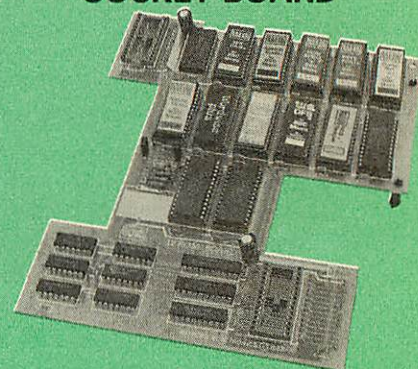
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector. Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

### SOLDERLESS SIDeways ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

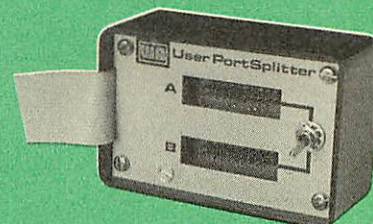
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only **£32**  
Battery backup fitted **£36**  
Battery Backup only **£3**  
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: **£8**

### USER PORT SPLITTER UNIT

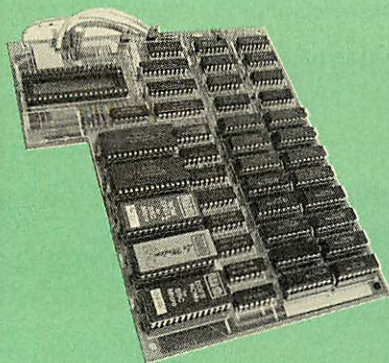


Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)



## ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPILL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later:

Please write in for further details.

### INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM .....£48
  - ROM/RAM card with 64k dynamic RAM .....£65
  - ROM/RAM card with a massive 128k dynamic RAM .....£109
- (carriage on ROM-RAM Card £3)

### OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit .....£17
  - 16k Dynamic RAM for Upgrade .....£17.50
  - Battery backup .....£3
  - Read and Write protect switches .....£2 each
- Complete ROM-RAM board  
All options installed .....£115

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

## Le Modem



### The MODEM from Watford

The features that make Le MODEM such good value are:

- Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!
- Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.
- Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.
- A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!
- FULLY controlled by simple \*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!
- Connects to the 1MHz bus. A \*AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.
- Completely self contained with internal mains power supply. (Even a free mains plug is fitted!)
- A \*TEST facility gives ON SCREEN indication that Le MODEM is working correctly.
- FREE Registration to MicroLink.

### SALE OFFER £62 (carr £5)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)  
(Write in for further details)

## APOLLO



### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

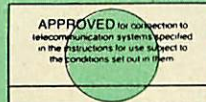
- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- FREE Registration to MicroLink.
- £6.50 off annual Membership to Micronet, Prestel and Telecom Gold.

### Sale Offer: £64 (Carr £5)

Price includes, the Modem, Comm Software Cables & Operating Manual).  
(Write in for full specification)

NEW

## Aries 1200 MODEM



*If you thought £150 didn't buy much of a modem you haven't heard about the aries 1200*

Up till now buying a modem was a compromise between price and performance, but the new Aries 1200 offers performance and features not found on modems costing two or three times as much. Look at the features offered by the Aries 1200, features which you wouldn't expect from a modem at this price – and some which you would be lucky to find on a modem at any price.

- Operates in V21 (300/300), V23 (1200/75 and 75/1200) and proprietary V23 1200 mode.
- Connect it to any type of computer or terminal via the 25 way serial D connector or the BBC standard 5 pin Domino socket.
- A built in phone socket means your phone plugs straight through.
- A reset switch so the hardware makes it easy to restart – even when your software doesn't.
- Industry standard Hayes (C) compatibility means that this is one of the easiest modems to use. It can automatically work out the speed your computer is working at, and even the speed and protocol of the modem at the other end.
- Auto Call mode can dial using tone or pulse (the modem works that out too), and when it connects it will automatically determine the speed of the answering modem.
- Auto answer mode means the modem can be left unattended to answer calls from other modems, and of course it automatically works out the speed and protocol of the calling modem.
- The built in speaker and front panel LED's mean that you always know what the modem is doing.

... Features at any price.

- Proprietary V23 mode mean that two Aries 1200's can communicate at 1200/1200 and in this situation you can take advantage of the built in data compaction which reduces the volume of text you send by 30%.
- Built in scrambler means that data transferred between two Aries modems is automatically encrypted. The encryption code can be user defined for a totally private email system.
- User defined control commands means that the Aries can even be used from a dumb terminal or with non standard software.
- Front panel light include indicators for Power, Auto Answer Mode, Transmit, Receive, On line, Terminal ready and Carrier Detect. There's even an indicator to show the quality of the phone line.
- Internal watch-dog monitors the modems activity and in the event of a power failure or computer crash it automatically resets the modem. The Aries modem can never hold open your phone line or lock up your computer.
- Built in printer port allows the Aries to direct incoming data directly to a printer, text can be tagged so that it is selectively sent either to the printer or the computer.
- All modem settings are stored in solid state non volatile memory – no battery to go flat and hang crash the system.

### Launch Offer Only: £149

Hayes Compatible BBC Comms Software ROM & Manual £25

WATFORD CUT PRICES NOT PERFORMANCE

Continued





### COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

### Wordwise

£26

### Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

### Word-Aid

The most comprehensive  
utilities ROM  
for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

### INTER CHART

ONLY: £25

### Inter-WORD

£36

### MEGA-3 ROM

Interword, Intersheet & Interchart –  
3 in one ROM

£76

INTERBASE £49

All Prices Exclusive of VAT

## VIEW

VIEW WORDPROCESSOR 2.1 £35

VIEW 3.0 ROM £48

VIEW PROFESSIONAL £59

HI-VIEW (for 6502 2nd Processor) £36

VIEWSHEET (Acornsoft) £36

VIEWSTORE £36

VIEWSPELL with 80 track disc £29

VIEWPLOT Disc £20  
(Please specify for Master 128 or Compact)

VIEW-INDEX £12

OVERVIEW Packs 1 & 2 £69

### Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

### BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £11.25
- Maths with a Story 2 (Disc) 4 further maths programs £11.25
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs £17
- WAVES: Science Topics (Disc) CSC O Level Physics program. £14.95
- RELATIONSHIP: Science (Disc) O Level Biology program. £20.00
- BONDING: Science (Disc) O Level Chemistry program. £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. £20.00
- ELECTRONICS IN ACTION (Disc) O Level program £19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. £20
- ECOLOGY (Disc) O Level program. £20
- POLYMERS (Disc) O Level program. £20
- Classification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20
- FOOD & POPULATION (Disc) O Level program. £20
- MICROTECHNOLOGY (Cassette) O Level program. £11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette) £19.95
- Modern Master (Disc) £11.25
- ADVANCED TELETXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20
- Astronomy – Primary (Disc) £12
- Computers at Work – Primary £17.35
- Introducing Geography – Primary £17
- Introducing Geography 11-17yrs £17.50
- Electric Fields 6-14 years £11.25
- BlackQueen Contract Bridge £13
- Espana Viva – 3 Discs £19.95
- A Vous La France Disc £21.50

### MINI OFFICE II

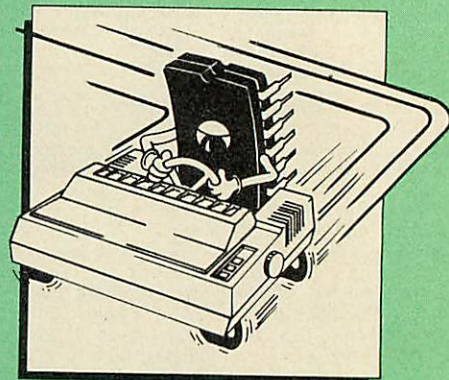
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

### Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30

### VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, Hi80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

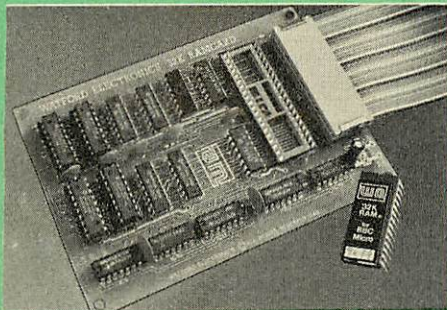
NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute \* command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33



## 32K SHADOW RAM- Printer Buffer Expansion Board



### A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (\*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)

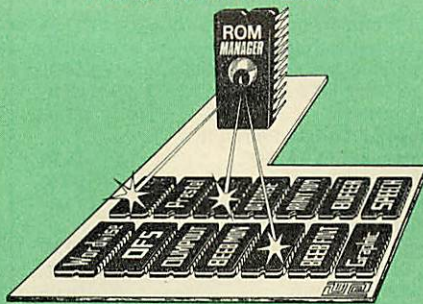
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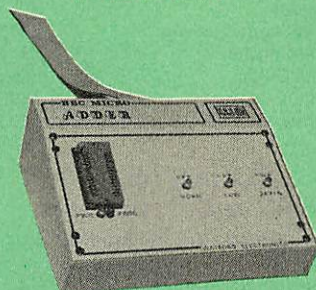


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To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

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**Continued** →



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At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

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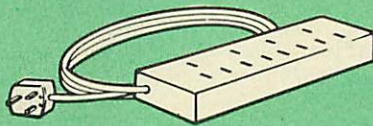
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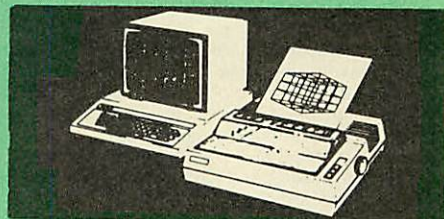
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- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro ... it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

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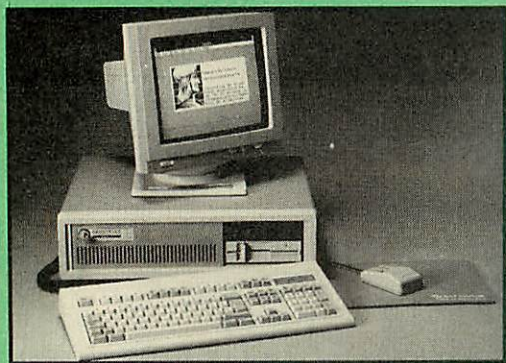


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Because the Aries 8MHz PC-88 system starts at just £489\* ... and a 40MByte system with EGA monitor costs only £999!

### ARIES PC-XT 88



#### Specification:

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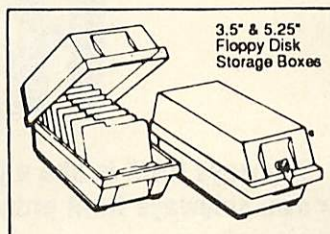
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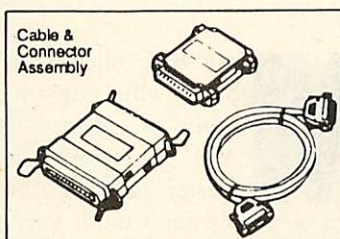
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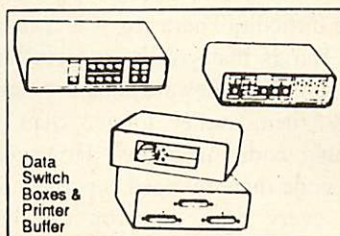
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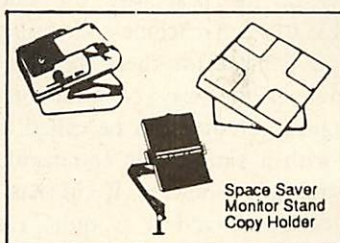
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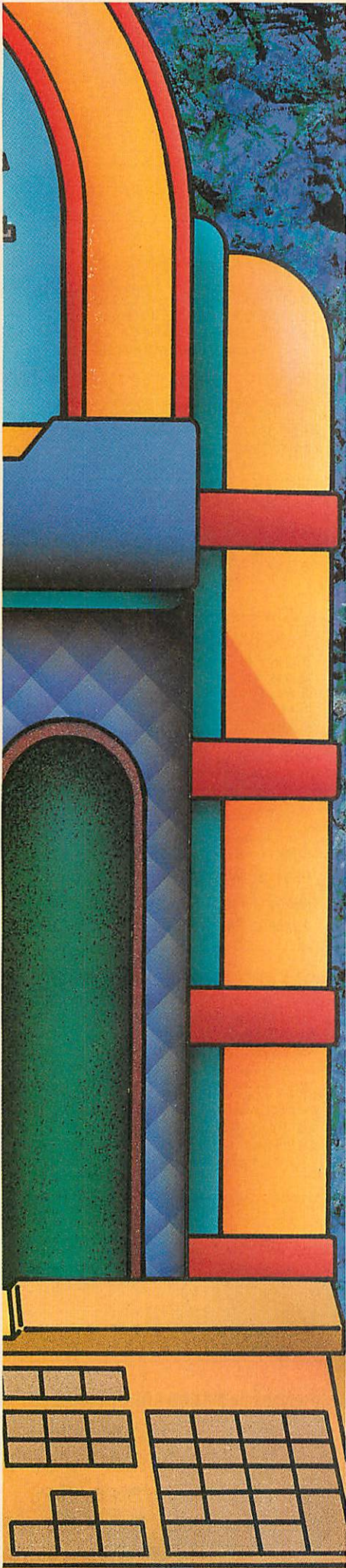
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# HIT AND RAM

**Sideways RAM is like a jukebox – we make it easier to write your own sideways RAM programs with an example for Wordwise Plus**

**David Harper**

**M**any BBC micros are now fitted with one or more banks of sideways RAM. And it's standard on the Master 128 and Compact. But most people don't use it very much for their own programs: ROM images are the usual fare. There is a feeling around that sideways memory programming is difficult. There are, it is true, a few extra things that you have to include in programs for sideways memory and this makes them rather longer than other machine code programs. However the extra code that you need is practically the same every time, and you can keep a standard piece of coding that you just tack on to each program.

One of the best uses for sideways RAM is to store machine-code utilities. It is a good place for them, because they are not in the way of your ordinary programs, yet they can be called at any time with a simple star command. The BBC micro's sideways RAM has been well designed, and it is quite easy to make use of it.

The first part of listing 1 in the yellow pages is a block of program that makes it simple to set up a sideways ROM. You just need to adjust the data statements, and then you can include it in almost any sideways memory program. Anyone who has had experience in writing small machine code programs in normal RAM will find it just as easy to write programs for sideways RAM, and sometimes it is actually easier. The whole listing shows how it can be done. It incorporates the block into a utility for converting programs between Basic and *Wordwise Plus* for easy editing.

There are two things that you must do

if you're programming for sideways RAM. The first is that you get into the habit of saving your programs before trying them out. This is a good idea anyway, but is vital for programs in sideways RAM. A bug in a program in sideways memory can easily crash the computer completely, so that not even pressing CTRL/Break will restart it. You might have to turn everything off and back on again.

The other thing is this: get hold of the Basic 2 chip if you still have the Basic 1. The way to find out is to type \*Basic followed by REPORT. Basic 1 has a 1981 copyright date.

Listing 1 is written for Basic 2, and would be quite awkward to convert to work with the earlier version. The important feature for assembly language programmers is the OPT 4 to 7 facility, which allows you to assemble machine code in a different part of memory from where it is finally going to run. You can't usually assemble code directly into sideways memory, but Basic 2 allows you to treat it as though you could.

The 6502 microprocessor at the heart of the BBC computer can only make use of 64k of memory. Sideways memory, sometimes called paged or bank-switched memory, is a way of getting around this limit. The idea is that there are several separate 'banks' of memory which all have the same memory address as far as the microprocessor is concerned. At any one time only one of the banks is accessible. In order for it to get at the information in one of the other banks, the old bank has to be switched off and replaced by the new one. Like a jukebox, you can have lots of records, but only play one at a time. The BBC micro is



designed to take 'records', or up to 16 banks of sideways RAM, even though the model B only has four actual sockets to plug them in. Each occupies memory between address &8000 & BFFF. Because they are electronic, the 'records' can be changed very quickly.

The memory banks are numbered from 0 to &F. From the hardware point of view, a bank is switched on by storing its number in location &FE30. So, for example, memory bank &D is made the current bank by the instructions:

```
LDA #&D:STA &FE30
```

Knowing this is no actual use, though, since a program in sideways memory can never switch itself on by this method. But there are a number of ways that programs in sideways memory can be called. The operating system makes sure that the right bank is switched on at the right time, so you don't have to worry.

A program in sideways RAM differs from one in normal RAM in three ways: the sideways memory header, handling the sideways memory service calls, and the use of extended vectors. It also needs to deal with errors slightly differently.

## The sideways memory header

Each bank of sideways memory has to begin with a particular pattern of data, called the Header. Without this, the software will not work. The contents of

Location	Contents
&8000-&8002	JMP to language entry point
&8003-&8005	JMP to service entry point
&8006	Type byte - &82 or &C2
&8007	Copyright message offset
&8008	Version number
&8009 ...	Program title
&8000 plus contents of &8007	Copyright message

**Table 1. Contents of sideways memory header**

the header are shown in Table 1. There are three ways of entering the code in sideways memory: as a language, by a service call or via an extended vector. A 'language' is a program which, once it is entered, remains active until another language is selected. It can be a genuine programming language, like Pascal or Basic, or something like a wordprocessor or a database, and it is bound to be large and rather complex. For a language, the first three bytes of sideways memory must point to the start of the language

program, and the type byte at location &8006 should be set to &C2. If you're into writing language programs then you need only check the necessary details in the *New Advanced User Guide* or Bruce Smith's *Advanced Sideways RAM User Guide*.

If your program is not a language, then the type byte, location &8006, should have the value &82, and the three language entry bytes should be zero.

The three bytes beginning at location &8003 are more important. At various times the operating system sends what are known as 'service calls' to each of the banks of sideways memory. Every bank has to contain some code to handle these - even if it is no more than an RTS instruction - otherwise the system will crash. Locations &8003 to &8005 must contain a JMP instruction to the start of that code.

You have to include a copyright message, and it must begin with the four bytes &00, &28, &43, &29 (a zero byte followed by '(C)') and the message has to end with another zero.

The byte at &8007 must be set to the distance from &8000 to the first byte of the message. So for example, the zero byte at the beginning of the message is at location &8016, then location &8007 must contain &16.

You might be inclined to leave out the copyright message in programs you write for yourself, but if you do then they won't work. When you switch on the computer, or press Break, the operating system looks at all of the sideways memory slots to find out which of them are occupied. It does this by checking on the first four bytes of the copyright message. This means that if your program does not have a message beginning with the right sequence of bytes, then the computer won't recognise it. Your message doesn't need to contain anything more than the introductory sequence, but it can be a good idea to add something like the date to help keep track of

program revisions. Other parts of the header are less important. The version number doesn't matter much either, though you might as well have one. You can often arrange for \*Help to print out the title on the screen. On a Master, the \*Roms command does this for you.

## Sideways memory service calls

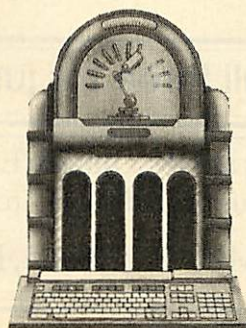
Service calls are one way that the computer signals to the programs in sideways memory that something has happened. It's a good idea to arrange your program to take advantage of some of these things. All that actually happens at a service call is that each memory bank is switched on in turn, beginning with the highest numbered one, and each time, there is a JSR to location &8003 (ie, the instruction 'JMP to service entry point' in the header).

When your program receives a service call the A, X and Y registers of the 6502 will contain certain information. The number in the X register will be the number of the memory bank that your program is in. The Y register may contain a parameter. But the interesting number is the one in A, as this tells you what the call is about. If it turns out to be a call which you're not interested in, then your program can just exit with an RTS instruction.

When your program has finished dealing with any service call it is important that the values in the registers are put back, so that the programs in other banks of sideways RAM can respond properly. The only real exception is when your program has dealt with a call completely and you want the other memory banks to ignore it. In this case your program can set A to zero.

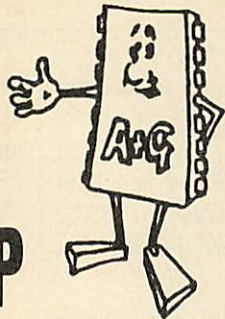
There are about 20 service calls in all, and many of them have rather specialised uses. But there are about five that are most useful.

The call with A=1 is issued when Break has been pressed. Its real use is to allow sideways ROMs to make sure that there is enough workspace in normal RAM for their needs. (This has the effect of raising the value of PAGE on the model B and B+.) It is often useful to arrange for your program to recognise Break, and you can use this call to tell when it has been pressed. On a Master, the A=1 call is only used on a CTRL-Break. A new call with A=&27 is used on a normal Break - you should use this instead.





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A=4 is the unknown command call. This one is very useful – it means that a star command has been used which the operating system doesn't recognise. The command is always stored in memory beginning at an address given in locations &F2 and &F3 plus the entire contents of the Y register.

This is a way of making your own program respond to star commands. Suppose you want to make your program take some action in response to a particular keyword that you have chosen. All the program needs to do is to compare your chosen word with the text beginning '(&F2),Y'. If they are the same, then your program does whatever it should.

The A=5 call occurs when there has been an interrupt which the operating system cannot deal with. If you are using interrupts, then using this call is a bit simpler than intercepting the IRQ vectors. You must exit with an RTS rather than an RTI.

The call with A=6 happens whenever the computer comes to a BRK instruction. It can often be a good idea to make your program reset itself whenever an error happens (perhaps even including when Escape is pressed). With utilities in standard RAM you can usually do this by intercepting the BRK vector at locations &202 and &203. But because of the way the system deals with errors, this can be awkward for programs in sideways memory. The service call with A=6 gets round the difficulty, and in any case it is easier than fiddling with the vectors.

Finally, if A=9, it means there has been a \*Help instruction. Your program does not have to respond to \*Help, but I find that it is useful to make a program print out its title at least. This is an easy way of checking that it's loaded correctly.

## Extended vectors

If you've done much machine code programming on the BBC micro you have probably used one or more of the vectors –BRKV and EVNTV and so on. The idea of vectors is to make it possible for your program to control almost anything that the computer does. Whenever there is a call to one of the operating system routines then rather than going straight into a routine in ROM, the computer looks at a couple of locations in RAM, known as vectors. The vector contains the address of the start of the appropriate ROM routine.

```
>LIST
10 REM SW RAM Utility (Basic / Wordwise-Plus Swap)
20 REM By David Harper
30 REM For BBC B/B+/M/C with SW RAM, Basic II (and Wordwise-Plus)
40 REM (c)
50 :
60 addr=&B0
70 fileadd=&B2:buffadd=&B4
80 :
90 DATA 82
100 DATA BASIC / WORDWISE-PLUS Swap
110 DATA 0
120 DATA 14th July 1988
130 DATA 1,SWAP,swap
140 DATA 2
150 DATA 1,break,6,iserror
160 DATA 5
170 DATA E,newwrchv,10,newrdchv
180 DATA 12,newfilev,14,newargsv
190 DATA 1c,newfindv
200 DATA 500,SWAP
210 :
220 READ Type$:Type%=EVAL("&"+Type$)
230 READ Title$,Version$,Copyrt$
240 READ NumKeywds%
250 IF NumKeywds%>0:PROCReadKW
260 READ NumSC%
270 IF NumSC%>0:PROCReadSC
280 READ NumVects%
290 IF NumVects%>0:PROCReadXV
```

Sideways RAM header program listed in Basic. Type \*Swap to switch to Wordwise Plus

This means that if you want something else to happen whenever one of the OS calls is made, all you need to do is to change the contents of the appropriate vector so that it points to a routine in your own program.

This is quite simple if your program is in normal memory. If it is in sideways RAM, it doesn't work, because when the OS call happens, the current memory bank might not be the one with your program in.

But in addition to the normal vectors, each of which is two bytes, there is also a set of three byte vectors known as extended vectors. In each of these, one byte is used to indicate the number of the sideways memory bank, and the other two are the address – as is this case in a normal vector.

Using the extended vectors is exactly the same as using the normal ones, but they are a little more fiddly to set up. There are three things you need to do.

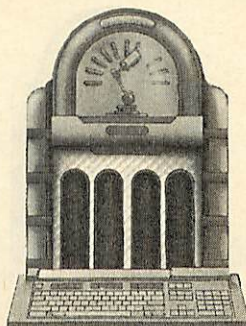
First you need to find out where the extended vectors are. Unlike the standard vectors, which are always at the beginning of page &2, the extended vectors may be

in different places. To find where they are, you use Osbyte call with A=&AB, X=0, Y=255. On return, the location of the extended vector table will be in X (low byte) and Y (high byte). This Osbyte call will, of course, give you the same result every time, so you could do it once and for all, and use the result.

But if you are writing a program to be usable on any micro, it's better to make your program do the call when it sets up its vectors.

After you know where the vectors are, the normal page &2 vectors have to be set up differently from normal, so that when the OS call is made the machine looks at the extended vectors. Think of the vectors being numbered: the vector at &200 is number 0, the one at &202 number 1, at &204 number 2 and so on – so that the vector number is half the low byte of the vector address. For any extended vector you want to use, you must make the page &2 vector point to &FF00 plus three times the vector number. Suppose you want to intercept Oswrch at &FFEE. The vector is at location &20E, so its number is 7 (half of &E). Three times 7 is &15 (21 in hex), so you must write &15 to location &20E and &FF to location &20F.

Next, you need to set up the extended vector itself. Each one takes up three bytes, the vector you want will be at the location given by Osbyte &AB plus three times the vector number. For Oswrch, if the extended vectors start at &D9F, then the right location is &D9F+&15, or &DB4.





## SIDEWAYS RAM

Once you have this address, set it up by making the first two bytes point to the address of your routine (just as you would with a normal vector), and in the third byte put the sideways RAM bank number. Your program can find this in the X register when a service call arrives. It can also be read from a copy of the bank number the system keeps in &F4.

All this sounds rather complicated, but in fact it is not too difficult.

### Error handling

The usual way that machine code programs deal with errors is with the BRK instruction. The normal pattern is that the BRK itself is followed by a byte that contains an error number and then the error message text, terminating with a zero byte.

Handling these errors, printing out the message and so on, is not done automatically by the system. It is controlled by the current language. When the machine comes across a BRK, it issues a service call with A=6, then switches in the current language before it jumps to the location pointed to by the BRK vector. If the BRK were to lie within your program, and the language in a different sideways RAM bank, then the error routine wouldn't be able to read the error message correctly.

The normal way around this is to copy the whole error sequence into normal RAM and then jump there. You could use any vacant area, but the usual place is the bottom of page &1. So when your program detects an error it should write a zero to location &100 (0 is the opcode for BRK), put an error number in location &101, put any error message beginning at location &102, end with another zero, and then do JMP &100.

If you want to do anything special with errors that aren't your own, it is almost always best to deal with it with service call 6.

### Zero-page workspace

Finding enough zero-page workspace is always a problem for machine code programmers. Locations &70 to &8F are left free by Basic, but other languages like wordprocessors can and do use them. So general purpose utilities have to avoid this area.

Locations &A8 to &AF are for your own star commands, but there are only eight bytes here and you may need more. There are other areas you can use – for

example &B0 to &BF is often used by sideways programs. And &C0 to &CF often seems safe. But these locations cannot be relied on, as lots of other software uses these locations too. Areas of Econet workspace are often safest on non-networked machines. You can't expect any of these locations to stay the same while your program isn't in use – they're only really usable for temporary storage because so much other software uses the same memory.

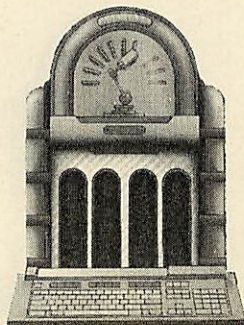
The first section of listing 1 on the yellow pages, up to line 10,000, forms a general purpose sideways RAM program. You can use this as part of any of your own programs, whether or not you are interested in the Swap utility itself. If you study the whole of the listing, though, you'll be able to see more easily how the control program works. The swap utility starts at line 10,000.

If you include the control section within one of your own programs it does the following. It provides the sideways memory header. It intercepts service call 4, checking whether any star command is one of your specified keywords, and if so it executes your program. Note that it doesn't allow for any parameters to be entered with the keywords: You'll have to alter the program a bit if you want to use keywords with parameters. It prints the program title whenever \*Help is entered. It intercepts any other service calls you wish to use. It provides routines for setting up extended vectors, and for replacing the original values. Finally, the listing will provide a simple technique for handling errors.

To use it you simply add your own coding to the end of it, along with the necessary information in DATA statements. You need to supply the data in the box at the beginning of the program.

Note that all hex numbers are entered without the initial '&'.

In addition to this you also need to add any assembler labels that you require: zero page locations, operating system



### DATA BOX

- A. The program type in hex (82 or C29)
- B. The program title
- C. The version number
- D. Copyright string, minus initial '(C)'
- E. The number of keywords to be recognized
- F. For each keyword:
  - (i) The word itself
  - (ii) The address label of the start of the coding that deals with it
- G. The number of service calls (other than calls 4 and 9) to be intercepted.
- H. For each such service call:
  - (i) The call number in hex
  - (ii) The address label of the start of the coding that handles the call
- I. The number of vectors to be intercepted
  - (i) The page 2 offset of the vector in hex (ie, twice the vector number)
  - (ii) The name of the address to which the extended vector is to point
- J. The size in hex of the memory block into which the code is to be assembled. This is used in a DIM statement, and must be a number larger than the total code size.
- K. The filename under which the code will be saved.

### BBC MICRO VECTORS

Address	Vector	Number
&200	USERV	0
&202	BRKV	1
&204	IRQ1V	2
&206	IRQ2V	3
&208	CLIV	4
&20A	BYTEV	5
&20C	WORDV	6
&20E	WRCHV	7
&210	RDCHV	8
&212	FILEV	9
&214	ARGSV	10
&216	BGETV	11
&218	BPUTV	12
&21A	GBPBV	13
&21C	FINDV	14
&21E	FSCV	15
&220	EVENTV	16
&222	UPTV	17
&224	NETV	18
&226	VDUV	19
&228	KEYV	20
&22A	INSV	21
&22C	REMV	22
&22E	CNPV	23
&230	IND1V	24
&232	IND2V	25
&234	IND3V	26



routines like *Oswrch*, your own code and a final ] and *ENDPROC*.

Writing programs using the control coding is very easy. For any keyword that your program is to respond to, you write the code that 'does the business' starting with an appropriate label (which is put in one of the *DATA* statements). Whenever the keyword is typed in, the control program checks it and uses your program. For example, in the program in listing 1 whenever *\*Swap* is entered, the computer jumps to location 'swap'.

Notice that the program will also respond to *\*Sw.* or *\*Swap*. When the action is completed, it should exit with an *RTS*. Any sideways memory service calls are set up in the same way (such as in lines 10000 to 10090 in the example program along with the data in lines 140 and 150 - data items *g* and *h*).

When you want to set up the extended vectors you are using, then you use the instruction '*JSR claim*'. This will write values to the page 2 and extended vectors (which you have specified in the data), so that they point to your own routines. In the example program after this has occurred, in the swap routine, on every call to *Oswrch* there is a jump to location '*newwrchv*'. You can replace the original values with '*JSR unclaim*'.

In some applications you may need to use the original vector values - they are stored (two bytes per vector) beginning at location '*oldvects*', and the extended vector values (three bytes each) at '*oldxvects*'. In each case they appear in the same order as in the *DATA* statement.

To use the error handling system all you do is replace the usual *BRK* instruction by '*JSR error*'. The *JSR* instruction is followed by an error number, a message and a zero byte.

## Example utility

Listing 1 contains an example utility that shows how all this works. It is a program that makes it easy to edit your Basic programs using *Wordwise Plus*.

*Wordwise Plus* makes a very good Basic program editor - the only trouble is that you have to be able to swap your program between the Basic and *Wordwise Plus* formats. In earlier issues of *Acorn User* there are descriptions of how to do this by spooling the listing to a disc, swapping between Basic and the wordprocessor, and then reading the spooled file in again. This can be quite slow for a long listing. This utility speeds

```
Words-1406 Characters free-18394 I

Start
REM SW RAM Utility (Basic /
Wordwise-Plus Swap)
REM By David Harper
REM For BBC B/B+/M/C with SW RAM, Basic
II (and Wordwise-Plus)
REM (c)
:
addr=&B0
fileadd=&B2:buffadd=&B4
:
DATA 82
DATA BASIC / WORDWISE-PLUS Swap
DATA 0
DATA 14th July 1988
DATA 1,SWAP,swap
DATA 2
DATA 1,break,6,iserror
DATA 5
DATA E,newwrchv,10,newrdchv
DATA 12,newfilev,14,newargsv
DATA 1C,newfindv
```

Again the sideways RAM header program, this time in *Wordwise Plus*, making it easier to edit

it up and makes it safer - because it's totally automated. Once the sideways program is loaded, all you have to do is to enter the command *\*Swap* from either Basic or the *Wordwise Plus* menu and your program will be swapped to the other format.

It works by intercepting vectors. When *\*Swap* is typed in, the program rewrites a number of vectors and extended vectors. It finds which way it is going by comparing the number of the memory slot of the current language with the slot containing Basic.

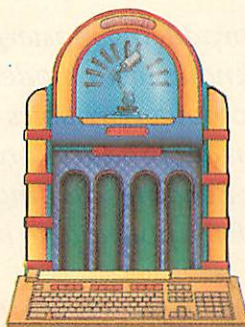
Intercepting the *Rdchv* vector makes it possible to feed commands to the computer as though they were entered from the keyboard. When swapping from Basic to *Wordwise Plus* the program is listed, except that *Wrchv* is intercepted so that the listing is written into sideways RAM rather than the screen (and without the line numbers). It is then loaded into *Wordwise Plus* by modifying *Osfile*. Going the other way, it is first saved into sideways memory, and then *Osrdch* is intercepted to feed it into Basic character by character - Basic adds the line

numbers itself. There are some slight complications to this. Because of the way *Wordwise Plus* works, you also need to intercept *Osargs* and *Osfind*. That's because it makes checks on the size of a file and whether it exists or not before loading or saving.

When it is loading or saving, *Wordwise Plus* does more than simply call the *Osfile* routine. In either case it first calls *Osargs* with *A* and *Y* set to zero to identify the filing system. It returns the value 4 if the disc filing system is active. It then attempts to *OPENIN* a file with the specified name to see if it exists already, and when loading, calls *Osargs* again to check the size of the file and ensure there is enough room in memory. If at any point a file was opened, it is carefully closed again. Next, it gives a warning message if you're trying to load a non-existent or too-big file, or if you're typing to save one that exists already. Only after all this does it actually load or save your text. The swapping program has to intercept *Osargs* and *Osfind* to keep control of all this.

The time taken to swap a program will depend on its size. Going from *Wordwise Plus* to Basic is a little over one second per kilobyte. The other way is about three times faster.

Note that this program won't work with the original *Wordwise*, since that loads and saves programs differently, using *BGET* and *BPUT*. If you have mastered all that is in this article, though, we believe you shouldn't have any difficulty rewriting it.





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# DON'T WALK, RUN

We look at the programming language of Wordwise Plus and see how you can lose space to improve it

**Chris Robbins**

**T**wo of the most widely used wordprocessing packages for BBC micros are *Wordwise* and *Wordwise Plus*. Both provide an enormous amount of text processing power. But *Wordwise Plus* has an additional feature that can increase that power enormously – the built-in text processing programming language.

The language allows you to customise *Wordwise Plus* to suit your own individual needs, and to write any number of special purpose programs to meet specific text processing needs. All this, without in any way interfering with the basic operation of the wordprocessor.

But there is a fly in the ointment. *Wordwise Plus* segment programs, sometimes called 'sprogs', take up space; they use memory that could otherwise be used by the wordprocessor to hold more text.

This can be a serious disadvantage, especially where space is at a premium, and you want all the text space you can lay your hands on in order to hold large documents.

Even with a second processor and the special version of *Hi-Wordwise Plus* (when you are using the BBC micro), it's still possible to find yourself running out of space all too easily.

However, there is an answer; a way of getting more text space without having to forgo the use of segment programs – you can simply reduce the amount of space they take up. But in order to do that, it becomes necessary to get rid of everything that's not absolutely essential to a program's operation.

The first and most obvious things to eliminate are REMs. Programs that don't

```

Words-58      Characters free-21361 1
Berkshire
2 January 1988

Dear psNS
    Society Subscriptions
Thank you for sending in your
subscription to the society. Your
address is recorded as:

psUS
psNS
psYS
psZS
psPS
telephone: psTS

Please advise the secretary if this is
wrong.
The next meeting of the Society has had

```

Segment programs occupy valuable space

explain themselves are usually a mistake. It's always easier to modify a commented program later.

Getting rid of REMs not only frees some space, it can speed things up as well. It's not merely a question of program size; the *Wordwise Plus* language, like normal Basic, is interpreted. It takes time for the interpreter to discover that the statement it's looking at is a REM, and yet more time to ignore it.

If you must hang on to a few comments in the interest of legibility of your programs, make sure they're not inside sections of code that are going to be executed a lot; avoid using constructs like this:

```

REPEAT
REM

```

```

...
...
...

```

```

TIMES n

```

where the REM is inside a loop.

That single blank REM tucked inside the loop can add around 70 per cent to



the basic loop execution overheads. The more REMs you have, and the longer they are, the greater the overheads. If that REM had actually contained some text, making it up to about 40 characters in length, it could easily add another 7-8 per cent to the overheads. So, eliminating REMs can make programs smaller and speed them up.

Blank lines also take up space. Not a lot perhaps, but it's worth recovering. There's a time recovery bonus with this one as well. If, in the example above, there had been a blank line instead of a REM, the loop overheads would have more than doubled. Two blank lines would double the cost again.

That's not to say that one blank line embedded in a REPEAT loop is going to double the overall execution time; rather that it will increase the effective overheads involved in executing the useful instructions inside the loop. The significance of these overheads will depend on the number of instructions in the loop, and the number of times the loop is executed.

In the *Wordwise Plus* language, spaces are redundant except in strings. They aren't needed to divide one keyword from another. So they too can be dispensed with altogether. Once again there's the added benefit of slightly reduced execution time too.

Having removed REMs, blank lines and all non-essential spaces, your original structured program will look something of a mess. But it will still be readable, just about.

How much space you can save this way rather depends on how the code was laid out in the first place – but you could halve the length of a well-written program in this way.





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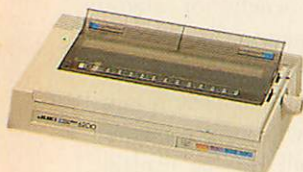
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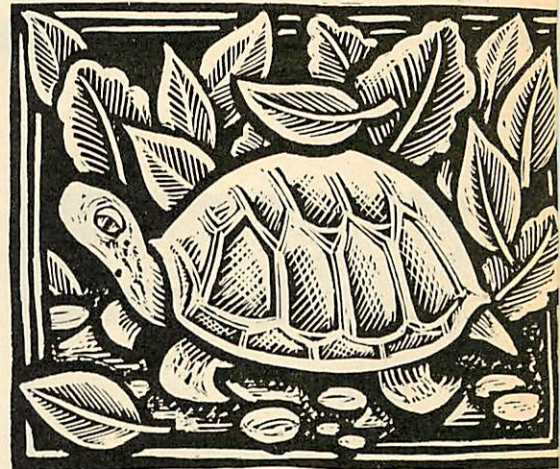


## MINIMUM ABBREVIATIONS

AND	A.	PTR#	PT.(or P. where
BPUT#	B.		this does not
CALL	C.		conflict with
CLOSE#	CLO.#		possible use as
CURSOR RIGHT	C.R.	RECOUNT	PAGE or PRINT)
CURSOR LEFT	C.L.	REPEAT	REC.
CURSOR UP	C.U.	REPLACE	R.
CURSOR DOWN	C.D.	SAVE PARAMS	REPL.
CURSOR AT	C.AT	SAVE TEXT	SA.PAR.
CURSOR TOP	C.T.	SAVE MARKED	SA.TE.
CURSOR BOTTOM	C.B.	SELECT TEXT	SA.M.
DEFAULTS	D.	SELECT SEGMENT	S.TE.
DELETE AT	DE.AT	SPOOL FILE	S.SEG.
DELETE LEFT	DE.L.	SPOOL MARKED	SP.F.
DELETE MARKED	DE.M.	SPOOL PAGE	SP.M.
DELETE MARKERS	DE.MARKERS	SPOOL TEXT	SP.P.
DELETE TEXT	DE.TE.	SWAP	SP.TE.
DELETE WORD	DE.W.	TIMES	SW.
DISPLAY	DI.	TYPE	T.
DIV	D.	TYPE SEGMENT	TY.
DOLINE	DOL.	UNTIL	TY.SEG.
DO THIS	DOT.	VDU	U.
ENDPROC	E.		V.
EOR	E.		
FIND	F.	<b>FUNCTIONS</b>	
FKEY	FK.	BGET#	BG. (B. if used
GOTO	G.		in the form
IF THEN	IF T.		<variable> = B.
LET	L.(LET may be		<channel>)
	omitted com-	CHR\$	C.
	pletely)	EXT#	EX.
LOAD PARAMS	LO.PAR.	FALSE	FA.
LOAD TEXT	LO.TE.	FREE	FR.
LOAD TTC	LO.TTC	GCF\$#	GCF.
MOD	M.	GCT\$	G.
NEW	N.	GLF\$#	GLF.
OSCLI	O.	GLT\$	GL.
PAGE	P.	OPENIN	OP.
PREVIEW FILE	PRE.F.	OPENOUT	OPENO.
PREVIEW MARKED	PRE.M.	PTR#	PT. (or P. where
PREVIEW PAGE	PRE.P.		this does not
PREVIEW TEXT	PRE.TE.		cause confusion
PRINT	P.		with PAGE or
PRINT FILE	P.F.		PRINT)
PRINT MARKED	P.M.	STR\$	ST.
PRINT TEXT	P.TE.	TRUE	TR.
		VARFREE	V.
		WORDS	W.

Note - 1) 'abbreviations' are not always shorter than the original keyword eg, the minimum abbreviation for AT is A. In such instances the abbreviation is not given.

Note - 2) different keywords may sometimes have the same abbreviation eg, Page (P.) and PRINT (P.), since the context will determine what it's an abbreviation for (see also use of BPUT# and BGET#)



## Keyword abbreviations

The program compression process can be taken even further. You can occasionally compress programs to around a quarter of their original size. Not bad, but how's it done? Well, just as with Basic commands, *Wordwise Plus* commands, functions and other keywords can be replaced by their abbreviations. The list in the box gives all the usable ones.

Replacing the keywords in your program by their abbreviations saves space - unlike Basic. Basic keywords are tokenised when you type them in. That is, each word is turned into a single code byte. Whether you type in PRINT or P., it becomes an &F1 byte. So you don't actually save any space.

But with *Wordwise Plus*, the full text of your program is retained in memory. Tokens aren't used. This means that an abbreviation of PREVIEW FILE to PRE.F. saves six bytes.

It's always worth bearing in mind that the way the original code is laid out not only determines its readability, but it can also affect space requirements and overall program efficiency. For instance, by declaring procedures prior to their use you can increase the program size by a tiny amount.

However, depending on circumstances, overall execution overheads may be significantly reduced when the procedures are actually called.

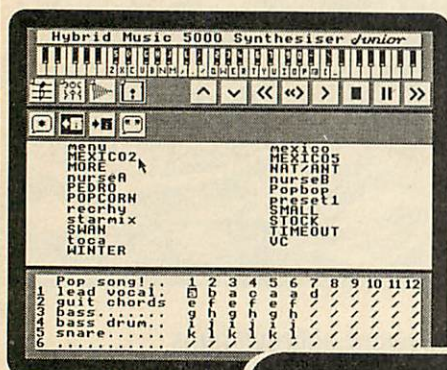
The final message is that it pays to write good, well formatted, and easily understood code to start with. Only when this 'source' code has been proven correct should any attempt be made to compress it.

*Wordwise Plus on ROM for the BBC B, B+, Master and Compact costs £56.35 from Computer Concepts, Gaddesden Place, Hemel Hempstead, Hertfordshire HP2 6EX.*

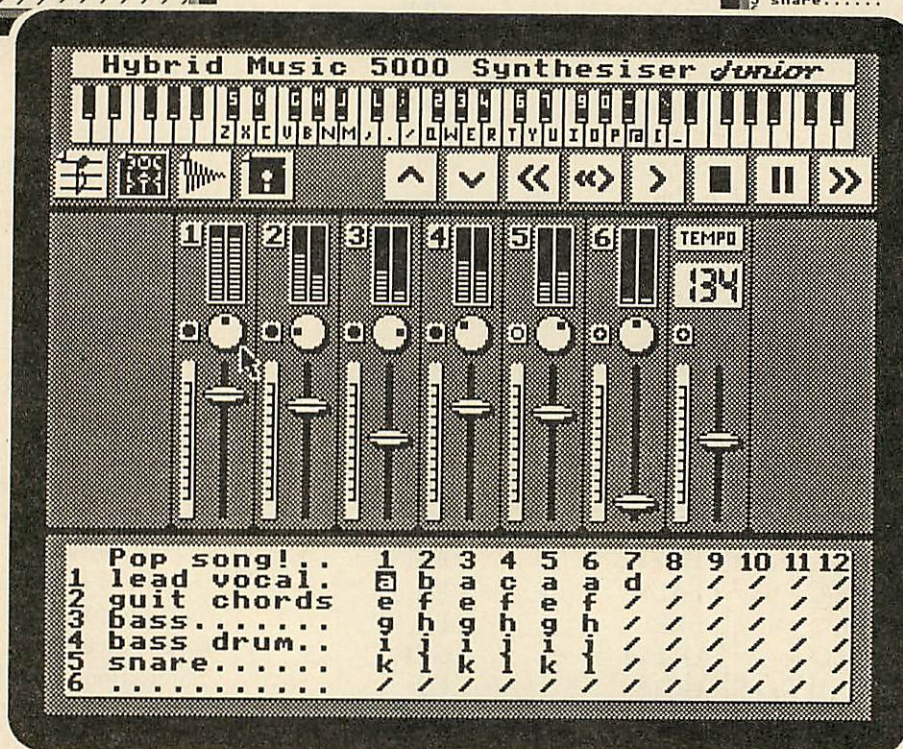
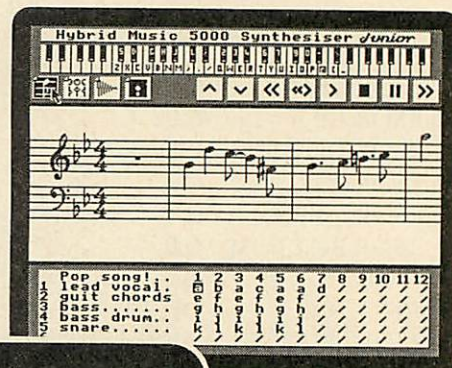


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- 1 Name five computers sold now or in the past by Acorn
- 2 In which year was Acorn Computers launched?
- 3 Name the current managing directors of Watford Electronics and Acorn Computers
- 4 How many 'bits' have the Archimedes, Master 128 and Electron?
- 5 Which BBC/Acorn magazine has the highest circulation?
- 6 When was the Archimedes launched?
- 7 What is the Archimedes' processor called?

The competition will be judged by the editor whose decision is final.

ANSWERS: 1 \_\_\_\_\_

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# TIME TO TAKE STOCK

Is the business market keeping up with the times? In this, the first of two articles, we take a closer peek

**Roger Carus**

It is almost three years since I wrote a full review of the business packages that are available for the BBC micro in these pages, so it seems a good time to look at what's happened since. The hardware has changed out of all recognition since then, with the arrival of the Master and then the Archimedes.

But what about the software? I started as I usually do by looking at the last few editions of *BBC Acorn User* (and other relevant magazines) to see what had been advertised or reviewed. I also inspected the most recent show catalogue in case I had missed anything and finally I then talked to a few knowledgeable friends in the business. Sadly, it did not produce as

much material as I had hoped.

There were only 16 advertisements clearly directed at the business market and perhaps half a dozen more of general use which could be applied to business purposes. This is only about half the number in late 1985. So what has happened?

I went back to first principles and asked myself what was missing? Had people stopped writing the software, or was it that all the likely needs had been met? The answer seems to be somewhere in between. The better products are still around while many others no longer attract so many buyers, and have become uneconomic to advertise. It seemed sensible to start with the hardware, and

there is no doubt that the introduction of the Master and Archimedes with their bigger memories, has greatly improved the amount of material the systems could handle. These machines also allow more sophisticated software (in part because they can be ADFS), and nowhere is this more apparent than the new relational databases such as those produced by Minerva Software.

The other aspect of hardware which has changed is in the way disc drives have become more standard, so adding quantity to the capability for processing. Three years ago it was always necessary to comment on the ability of systems to use cassettes, while there are few to be catered for today.



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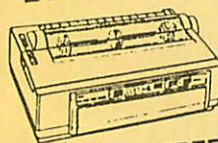
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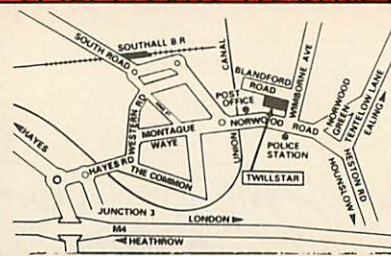
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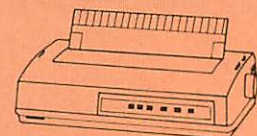
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## PRINTERS

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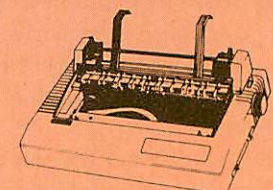
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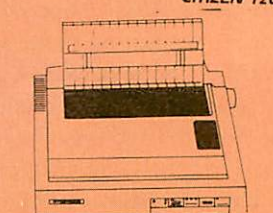
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## PRINTERS



The basic means of data processing are the wordprocessor, spreadsheet and database and among these there have been few changes aside from the introduction of *InterWord* and *InterBase*. True, the capacity to process data has been increased with the more powerful and faster machines, but this is where it ends.

In the case of wordprocessing the introduction of *InterWord* and the associated family of software was a significant step with its high power and low cost, and there have been improved editions of *Wordwise Plus* and *View* (particularly *OverView*) to reflect the changes taking place in the basic processing unit.

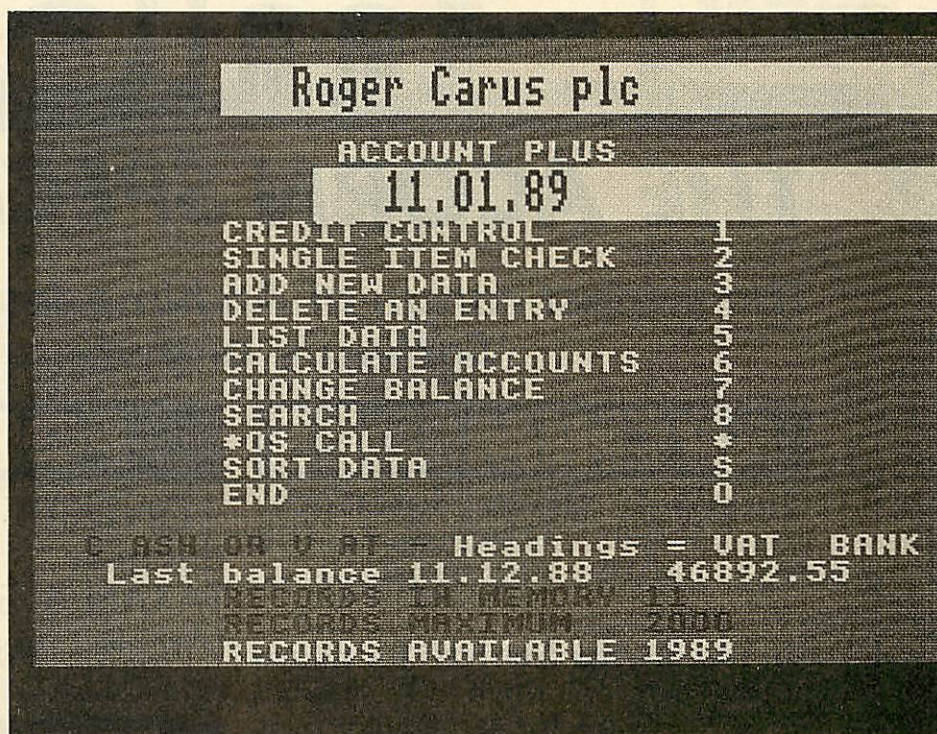
The use of spelling checkers has become much more general and each has its own virtues. Other packages have disappeared from the scene, but several specific wordprocessors, usually for scientific or language work, have been launched.

Acorn's *First Word Plus* for the Archimedes with at least a megabyte of memory and a suitable printer represents a truly professional package with most of the features likely to be needed by a typist. It also has the ability for mail-merging, and can incorporate graphics work with several documents at once and add footnotes.

These developments have been complemented by the arrival of desktop publishing which takes the idea of wordprocessing a step further. It allows the production of an integrated document, ready for use, in much the way that a full printing service would aim to do. This has created an opportunity for the user to extend the whole scope of work to include text, tabulated data, graphics and even colour. Acorn is soon to release a DTP package for the Arc from the same stable as *First Word Plus*.

The changes in spreadsheets have been less obvious, if only because those which were popular already met the needs of the market, and the addition of more memory and speed was all that was required to allow them to handle vast quantities of data and add-on graphics together with a few statistical functions. *InterSheet* with the help of *InterChart* and *ViewSheet* with *ViewPlot* have done well. Alas, *Ultracalc 2* seems to have disappeared from the market.

The exception to this trend has been *Logistix* from Acorn (£113.85 + VAT) which has clearly taken the idea much further for the Archimedes and combines



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many of the features of a spreadsheet, time planner, database and makes use of good graphics. The other in this class is Coltonsoft's *PipeDream* which was reviewed in June last year, and though really a spreadsheet with database features, it has the capability to handle text, though not to the full extent of a wordprocessor. Like the reviewer, I can think of many uses for it, but certainly not as a sole text processor.

In the case of the databases the greatest advances have been made with the power of the Master showing clearly what *ViewStore* in its numerous forms can do. It is easy to confuse the reader with capacities, but in actual practice the provision of a hard disc expands a database to a level where no normal user or small business would ever feel over crowded.

It is when the more specialist business packages are examined that the real questions of capacity arise, and it is here that the potential user has to take careful account of whether there is enough space on the disc, hard or soft for his or her likely needs.

I cannot repeat often enough how important it is to think carefully about what is likely to be asked of the system. It does not make sense to use much more hardware or more sophisticated software than you really need, since you not only have to pay for it but you also need to learn to operate it: both of these activities

take time, and time costs money. Ingenious programmers and salesmen will not like me for saying this, but choose a dedicated system if you can: one which will do the job you will need done for the next year or two and not much more – and choose the cheapest. Unless your business demands it, or you are sure that it will quite soon, do not worry about saving the odd millisecond!

Most small businesses are mainly concerned about keeping track of customers, stock, purchases and sales. If all goes well, they then need to keep accounts for the Inland Revenue in order to pay both income tax and VAT.

These are probably the main reasons that one of the longest surviving business packages is sold by Micro-Aid. This company recently moved from Cornwall to Ayreshire, and it has been in the business since 1978 selling a wide range of hardware and software by mail order. Director Colin Chatfield is a regular figure at exhibitions, and he sees clearly the benefits of simplicity.

The most obvious product of its business packages is *Account Plus* (£49.95 + VAT) which is available for every model of the BBC and Archimedes and represents amazingly good value as a suite of simple business programs. It uses Basic programming and is slow for processing, but reliable and simple, with the ability to meet most needs. It consists of semi-independent units which are



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available separately. The central unit of *Account Plus* is the *Cashbook* which is available on its own if required (£11.95 + VAT) and provides a double-entry book-keeping function with four columns of analysis into cash, bank credits and the corresponding debits. Any number of accounts can be maintained and grouped as required. The model B will hold up to 350 items in memory. Several files can be maintained individually, but at some inconvenience. More memory on later machines multiplies the capacity.

This may not seem glamorous but *Cashbook* is quite enough for many clubs and societies to maintain their transactions and for some small enterprises. A more elaborate system is its extension to become *Account* (£29.95 + VAT) which offers random access to disc files and so can take up to 2250 entries on a 200k disc and offers cash analysis or bank records together with credit control in a wide range of ledger facilities.

The combined unit, *Account Plus* does all these things and can also generate invoices, orders, credit notes, pro-forma statements and quotations.

At the same time nominal ledgers and addressed statements, drawing on random access mailing to a list of up to 500 addresses, provide for most of the common activities.

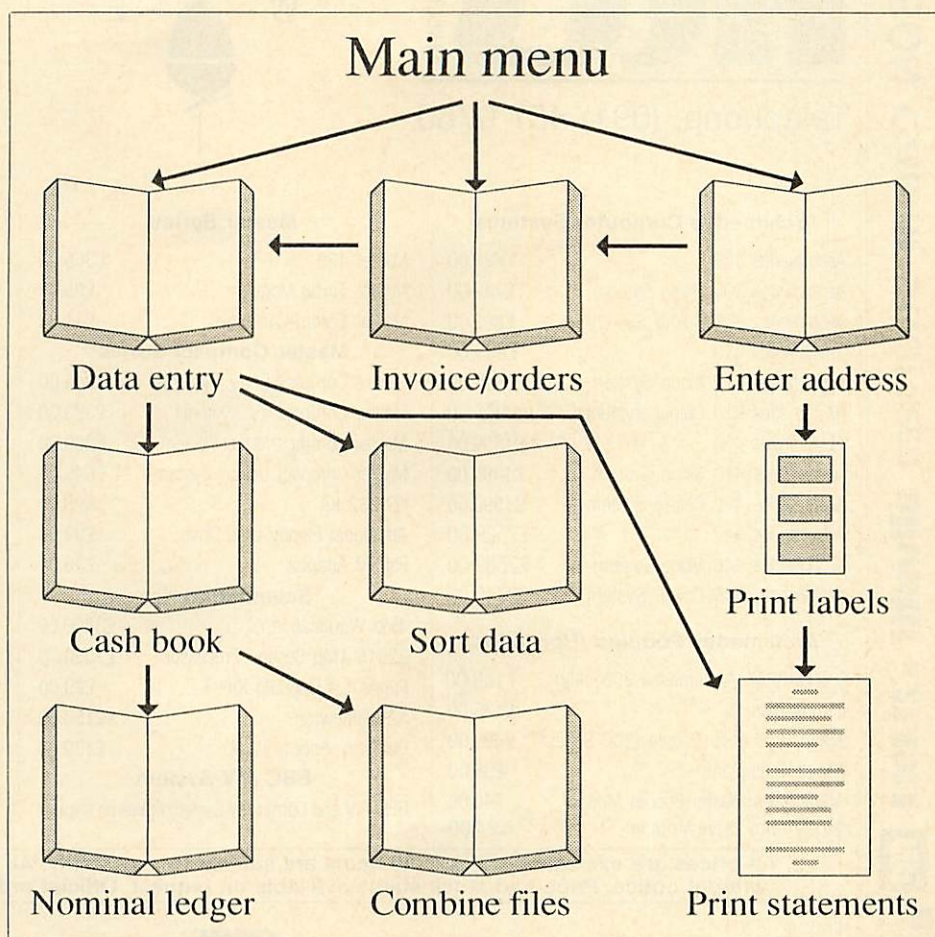
Using the BBC micro with a double-density disc drive, it will cater for 3500 accounts transactions and 1785 sales and purchase addresses. Less disc capacity clearly means proportionately less entries, and it will operate with any printer to produce hard copy.

The documentation is simply and cheaply produced in duplicated A4 format, but it is very clearly written and is, therefore, easy to follow.

There is a more advanced version called *Account Plus Stock* (£79.95 + VAT) in the final stages of preparation which does all the same things and adds on stock control with automatic pricing and some costing ability.

I do not think I would choose it to operate with an Archimedes, although it would work just as well, since that would be a little like using a racing car to go for the newspapers. It would also be a waste of the money spent on the Archimedes unless it was needed for other purposes.

Micro-Aid produces other useful packages for payroll and mailing, as well as the *MicroTrader* and *Micro Stock*. I have



A system diagram of the order in which *Account Plus* deals with data

not looked at these yet but they seem to offer equally good value.

At this stage it is as well to sit back for a moment and reflect on the amount and type of business that *Account Plus Stock* (since that is probably the version I would choose) would be sufficient for.

Let's assume we're dealing with a trading organisation which sells goods or services to clients who may come back for more, and wants to keep its accounts on an annual basis (ie, new records after a year). With the limits *Account Plus* sets of up to 500 customers and 1785 transactions in the year, more than half of which are sales, it is a sizeable operation. Even if the average transaction is as low as £5 (eg, selling a book by mail order) then that's a turnover of £4,500 a year. Obviously, if the value of the transactions is greater then there is potential for much more earnings.

Furthermore, *Extended Payroll* (£49.95 + VAT) provides both personnel and payroll packages for between 125 and 400 employees giving good facilities. I cannot easily imagine anyone wanting to use it at the top end of its scale since such an employer would have more powerful hardware, but the potential is

Roger Larus plc CASH BOOK

PAGE 1 11.01.89		RECEIPTS (Abts)		PAYMENTS (Crdts)	
		VAT	BANK	VAT	BANK
		W	H	W	H
1	11.12 Graham Bell	20.00	5.00	30.00	10.00
2	12.12 Robert Miller	55.00	100.00	40.00	90.00
3	11.12 Christina Neal	1000.00	2000.00	30.75	27.45
4	11.12 Pauline McIlernon	1.00	1200.00	1000.00	2000.00
5	11.12 Ter North	75.00	20.00	125.10	111000.00
6	11.12 Ian Finlay	200000.00	125.00	500.00	1000.00
7	12.12 Liz Thompson	25.00	500.00	20.35	10000.00
8	14.12 Paul Holmes	12.00	125.00	2500.00	5000.00
9	15.12 Seamus Geoghegan	1000.00	10000.00	1245.00	70000.00
10	11.12 Richard Power	12000.00	5.00	25.00	100.00
11	17.12 Tony Quinn	20000.00	2500.00	55.00	27.35
		234180.00	16638.75	4679.20	199255.00

Cashbook – also available on its own

there. Much the same can be said of the *Random Access Mailing* package (£29.95 + VAT) which can similarly deal with between 525 and 1785 records, which is big business.

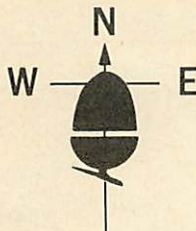
I started the first in this series of articles with the highly economical products from Micro-Aid because they provide a useful standard at the cheaper end of the market.

There is a high standard of competition for software competitors which have moved further up the market with better, faster software able to take on more difficult tasks. There is a place for them, and in the next issue their capabilities and potential will be examined.



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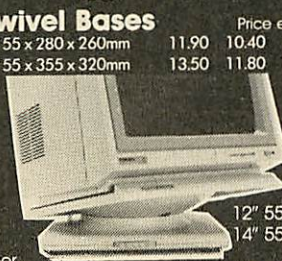


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# SPYRO MANIA

We've discovered a neat little program which allows you to create some amazing patterns on the screen of your BBC micro

**Steve Maguire**

A tiny little program, called *The Rose*, can draw an amazing variety of patterns on your computer's screen. To see some of them, and explore the range of patterns you can create, just type in the listing that we have included in the yellow pages.

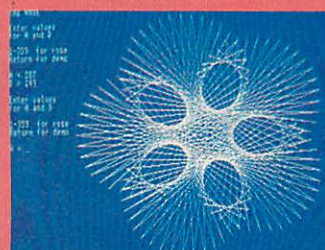
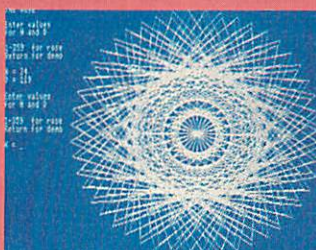
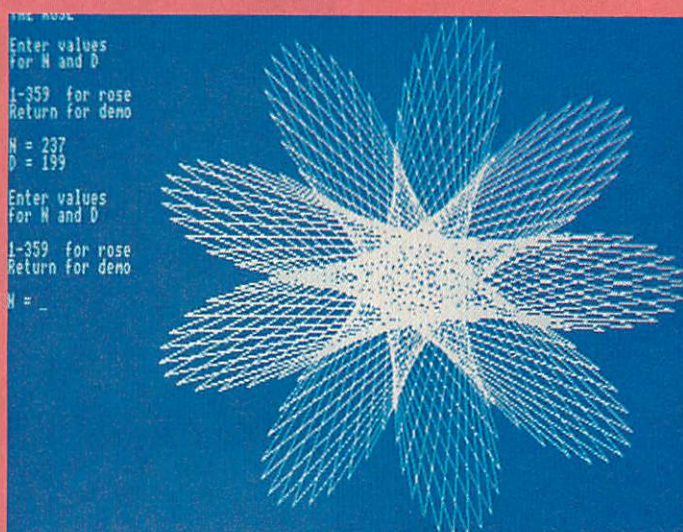
The Spirograph-like patterns are controlled by two numbers, N% and D% in the listing. You must type both of these numbers in. Each must be between one and 359.

The program includes an input section that allows you to type in the two numbers. Alternatively you can get it to pick random numbers for both N% and D% by using an out-of-range number for either of them – say -1. The final option is a demo mode – just press Return when prompted for N%.

While the computer is working on a pattern, pressing Escape will return you to the input section of the program. If you press Escape instead of entering a value for N% or D%, then the program will end.

Incidentally, PROC@ is a quick-save routine which reads the program title in the same way as the Archimedes' Basic 5. It takes the title from the word after the > marker in the first REM line, and saves the program using this as the filename. PROC@ also updates the version number in the second REM line so you can tell different versions of your program apart.

Finally, if you have a Master 128, then it automatically appends the current date to the version line. Just type PROC@ to save the program.



Three example Rose patterns created by using the following parameters: N=237, D=199; N=24, D=19; N=287, D=149. To add a screendump command, replace END in line 100 with IF INKEY (200) < > ASC"S" THEN END ELSE 'SDUMP.



# IN LIVING COLOUR

Following just a few simple rules we show you how to get the best from Life

Andrew Green

**T**he Hodgepodge machine offers computer enthusiasts a means of getting more out of *Life*. As regular readers will remember, John Conway's *Life* is a computer model based on a two-dimensional array of cells, which evolve with time in accordance with a set of very simple rules. Each cell in the array can take one of two values – alive or dead.

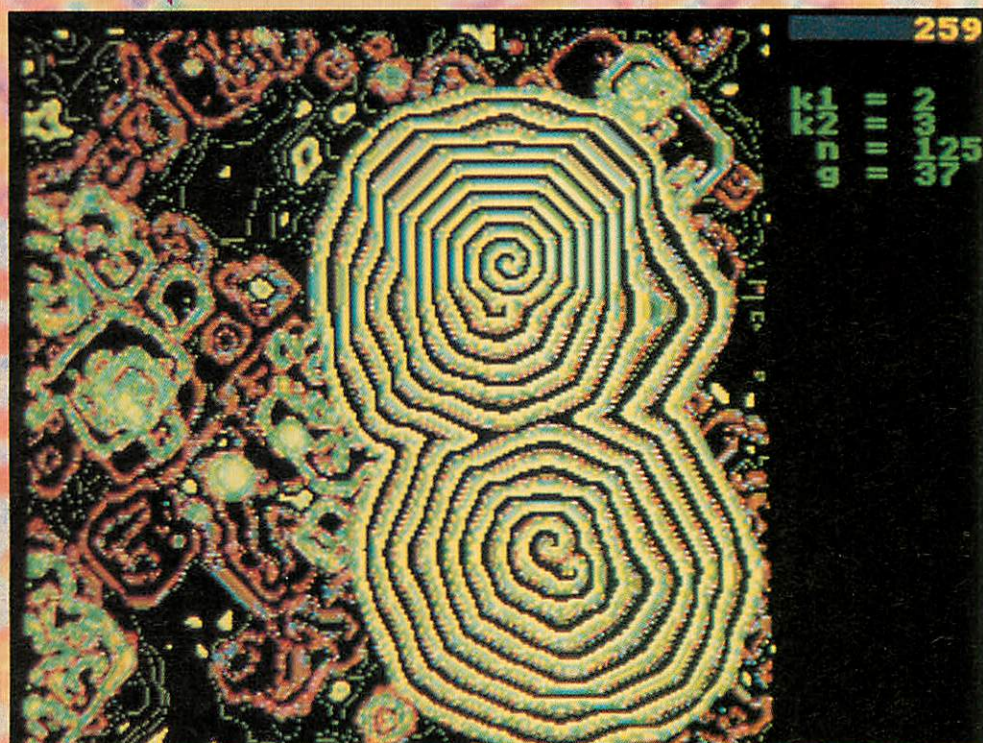
A living cell will only continue to live if there are at least two other cells, and no more than three other cells in the immediate neighbourhood. A dead cell will be revitalised if precisely three of its neighbours are alive – so cells can die of overcrowding or loneliness.

Given these few basic rules, a random initial pattern of living and dead cells is liable to display a complex evolution before eventually dying out or falling into some stable pattern.

In fact *Life* is just one of a variety of models that are generally known as cellular automata. Other variations have been presented in *Acorn User* – most recently Susan Stepney's one-dimensional version in the November 1988 issue.

The Hodgepodge machine offers particular value for money because it is not one but a whole series of cellular automata, characterised by having not just two cell states (alive or dead) but any number of states – the number is purely up to you.

Each possible state is represented on screen by a different colour, which makes watching a Hodgepodge pattern evolve more attractive than the traditional monochrome *Life* patterns. Having settled on a value for the number of states (and a



few other parameters), the Hodgepodge machine chooses a random pattern of cells (hence the name) and will display their subsequent evolution. The patterns are striking – particularly the spiralling wave pattern and competing technicolour blooms of cells which eternally burst and die away.

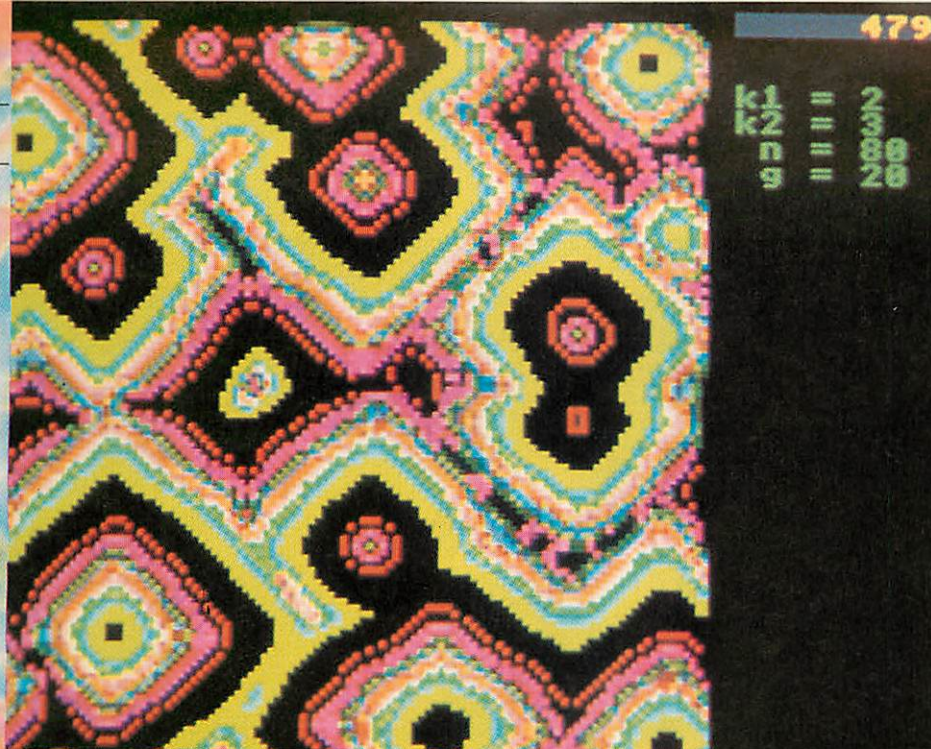
In fact the Hodgepodge machine is much more than just a pretty mathematical curiosity. Scientists have become particularly interested in this form of cellular automation because it seems to closely resemble the behaviour of certain chemical reactions, specifically where heat or particular ions are exchanged between chemicals in solution. A very readable article about the scientific think-

ing behind the Hodgepodge machine is listed at the end of the article – in fact it was this very article that led to the Archimedes version of the program that's listed in the yellow pages.

Like *Life* or a fractal pattern, it's a program that benefits greatly from the speed and graphics of the Arc. To see the Hodgepodge machine in action, simply type in the listing that is given in the yellow pages.

Each cell of the Hodgepodge model begins in a random state, with a value between zero and the highest state – you control this limit. A cell in state zero is 'dead', and a cell in any other state is 'alive'. All alive cells are 'active', except those that are in the top state; these can





best be seen as 'ill'. Perhaps the states are temperatures, where a cell can die of cold or fall ill through excessive heat.

The state of a cell in the next generation depends on whether it is dead, active or ill. A currently ill cell (in state  $n$ , where  $n$  is the highest state) will die. If the cell is active (states 1 to  $n-1$ ), then its future state is given by the formula:

$$(S \text{ DIV } A) + g$$

where  $S$  is the sum of all the states of the cell and its neighbours. The number of active neighbouring cells is  $A$  (including the cell itself), and  $g$  is a weighting factor that determines the speed of change of the pattern. If the cell is dead (state zero), its new state is governed by:

$$(A \text{ DIV } k_1) + (B \text{ DIV } k_2)$$

where  $B$  is the number of ill neighbouring cells and  $k_1$  and  $k_2$  are constants (in fact  $k_1$  is 2 and  $k_2$  is 3 in this machine). All the variables and results are integers, which makes the maths a lot faster. Once the values of  $n$ ,  $k_1$ ,  $k_2$ , and  $g$  are built in to the model, the next generation of the pattern can be calculated from this set of three rules.

The implementation of the Hodgepodge machine listed in the yellow pages provides the option of setting the values of  $n$  (something between 2 and 255) and  $g$  (between 1 and 255). It is best not to

set the value of  $g$  higher than the value of  $n$ . The two constants  $k_1$  and  $k_2$  can't be changed.

You'll also be asked to set the cell size as small or large (1 or 2). This determines whether the array contains about 58,000 cells (240 by 240), or only 15,000 cells (140 by 140) – which makes for much faster calculation of each generation.

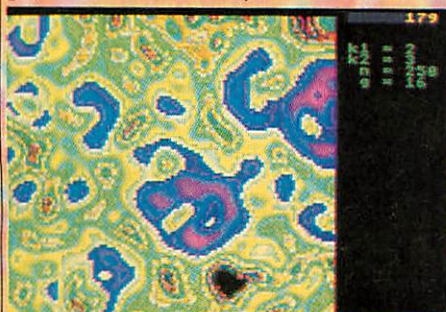
When selecting each parameter, just pressing Return leaves the parameter at its current value. Once the machine is running however, it will continue until Escape is pressed.

Actually using the program is quite straightforward, and by experimenting with different values of  $n$  and  $g$  you should eventually be able to recognise some of the distinct forms of behaviour which is typical of the model.

You might like to try some of the values listed in the table below. The pictures give you some idea of what to expect, though they give no more than a flavour of the movement of the patterns.

You'll find it necessary to run the program several times before you appreciate the dynamism in the patterns, and see wave structures spiralling and sweeping across the screen.

Reference: 'The Hodgepodge machine makes waves' by AK Dewdney, P 86-89 Scientific American, August 1988 (v 259 ii).



VALUES FOR  $n$  AND  $g$

$n$	$g$	125	37
250	80	100	25
250	75	50	50
250	63	50	15
250	10	10	2
250	1	10	1

## PROGRAM DETAILS

PROCinterrupt is called when Escape is pressed. It gives you the option of rerunning or leaving the program to go back to Basic.

PROCinitialise sets up the global variables and allocates default conditions for  $n$  and  $g$ . It also checks the memory position of the screen RAM that's used to store and display the cell arrays. It needs to do this because direct screen access is used for speed.

PROCprocess is the main procedure. This loops indefinitely calling the machine code routine 'hodgepodge'. One screen bank is displayed while the other is being recalculated and updated. The finished bank is then displayed and the first used for the next generation. This eliminates any flicker on the screen as the array is being changed.

PROCinquire asks you for the values of  $n$  and  $g$ , and the cell size.

PROCcheckscreen size finds out if there is enough screen RAM allocated to allow two screen banks. If there isn't you'll need to change the configuration of your machine.

PROCshowparams is used to write the current values of  $k_1$ ,  $k_2$ ,  $n$  and  $g$  to both screen banks.

PROCsetuphodgepodge allocates a random initial value to each cell of the machine. This procedure runs rather slowly.

PROCassemble contains the ARM machine code which performs the calculations for one generation of cells and plots the results on the second of the two screen banks. The code is tuned for speed rather than elegance.



It's not often that something completely different arrives on a software reviewer's desk, but Data Design's *Designer Castles* is just that. It not only provided the inspiration for this article, it also occupied my two junior-aged children for hours. The object of their attention was a package that allowed them to design castles using a variety of standard features such as towers, walls, gateways and buildings, and print them out in kit form.

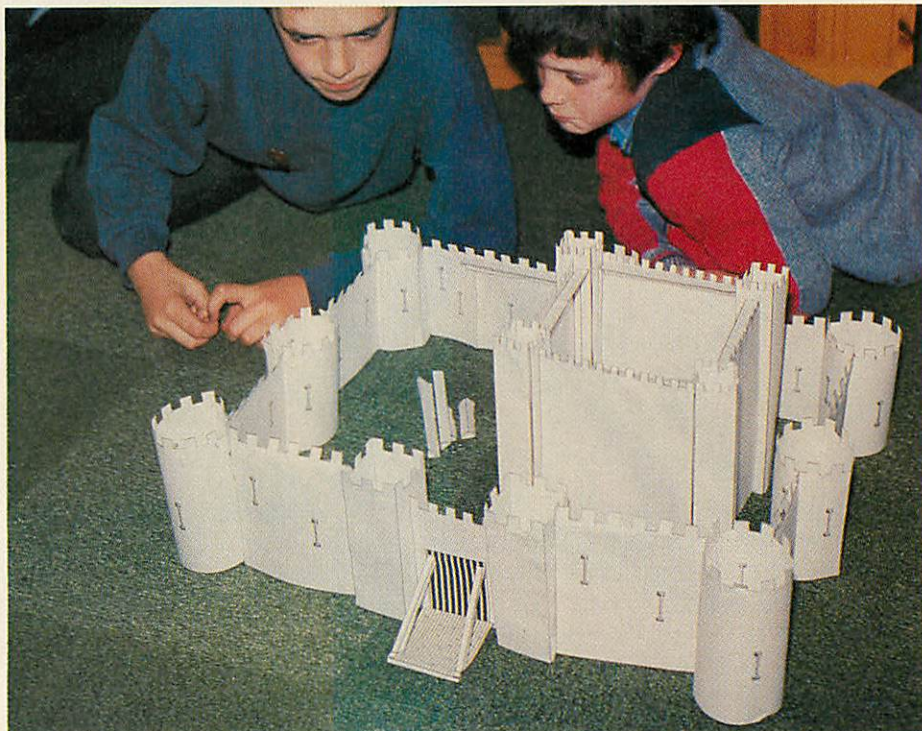
*Designer Castles* consists of three main elements: a comprehensive, ring-bound manual; master program disc, and a printer support chip. The builder needs to supply a data disc, large quantities of fanfold paper, scissors and glue as well as any paints and strengthening card that may be felt necessary. The publishers stress that they find fanfold listing paper quite adequate for most castle-building.

The program is controlled from a Wimp environment (windows, icons, menus and pointers) which means that all options are selected by 'clicking' on symbols on screen. Although the program is best used with a mouse, it is possible to use the keyboard's cursor keys.

The beauty of the software is its rapid learning curve – any user may become familiar with nearly all its principles with only a few minutes' tuition. The principles to be learned are, first of all, the method of pointing at and clicking on icons. The second principle is the first of the main design approaches embodied in *Designer Castles* – the idea of examining a design on more than one plane.

Castles are built up by creating strings of towers, walls and gateways in the bottom elevation box. Into this box, copies of the various elements of the castle wall are transferred and built up as complete units, ready to be transferred onto the main 'plan' view in the large design box (figure 1). The elements may be inserted at any position in the wall and redundant units may be consigned to the 'bin' which operates with a loud and satisfying scrunch!

A 'fine tune' feature exists whereby a second click on the mouse moves the wall a further five degrees. At this point, a minor criticism, I did find that the pointer was sometimes rather choosy about its position for accepting a 'click', and it was necessary to click again to get things moving. However, it is more a question of getting used to the software



## CUT OUT AND KEEP

**There's a completely new idea on the education software market – where children can become rulers of the castle**

***Chris Drage and Nick Evans***

and its sensitivity than anything else.

Once the wall is in place and 'fixed' it may be modified by transferring it back into the elevation editing window and replacing it on the plan screen. Thus errors of design may be corrected.

The excellent manual gives details of all dimensions for the various pieces of the castle-maker and consequently a properly executed and planned design should, in theory, work. As most people discover, the trial and error method is preferable for some activities since theories may be tested and modified until the required result is found.

The elements of the wall are selected from the row of images (icons) down the right-hand side of the screen. There are three sets of images available – walls and towers, buildings and siege weapons. It

is the child's task to string these elements together to represent either an imaginary castle, one that they are trying to replicate, or one which is designed to fulfil a specific need.

Once a satisfactory plan is finished, it can be printed out in both elevation and plan form. These two print-outs act as the blueprint for making up the pieces when they have been printed.

Printing may take place in one of two ways. Either the user continues to work direct from the editing screen and selects the print option, or the full-blown print quality may be chosen from the start screen on booting up the system. In both cases all the options are chosen by mouse click – which file to print and the size of the print-out – then the system takes over. Since printing the pieces is a



particularly long process, especially for large castles printed in large size, the computer is tied up for a great deal of time. So the user might know what is going on, a status screen displays whose work it is, which piece is being printed and whether it is in the loading or printing stage. The publishers recommend that printing should be done at times when the computer is not normally in use, and encourages children to save work to disc for later printing. Indeed, if they do not save it to disc, the final design is destroyed by the printing process. As with all other 'dangerous' aspects of this package, possible pitfalls are well signposted and yes or no choices are offered for confirmation of potentially destructive actions.

Where does this software fit into the educational scheme of things? First reactions might be that this is a history package and that's that. However, in a primary school this software is more likely to be used as part of an integrated project covering many curricular areas with a specific historical theme as its central focus. Examination of Fernleaf's excellent history resources catalogue shows how this approach is spreading.

To succeed pupils must first conceive the elements of their castle, make planning decisions about its individual parts, create a design and then finally build it. So that it might be successful in terms of its proportions, the children must work out dimensions and scales and apply them to the pieces of the castle jigsaw.

Judging by the enthusiasm of my children for this software there is likely to be little difficulty in extracting exciting written work from pupils, based not only upon the castles created, but also around the actual building process.

There are further fundamental issues about the CDT element of the package. By modifying the principles of the design it is possible for the children to create wholly new environments not dreamt of by the software writers. How, for example, would this software be used to design a castle built on the slope of a hill? How would one make the tower of a particular castle that looks unlike the elements provided?

Furthermore, there are questions relating to children's problems in dealing with the materials. For instance, how does one cut out the castle accurately but quickly? How does one best stick the

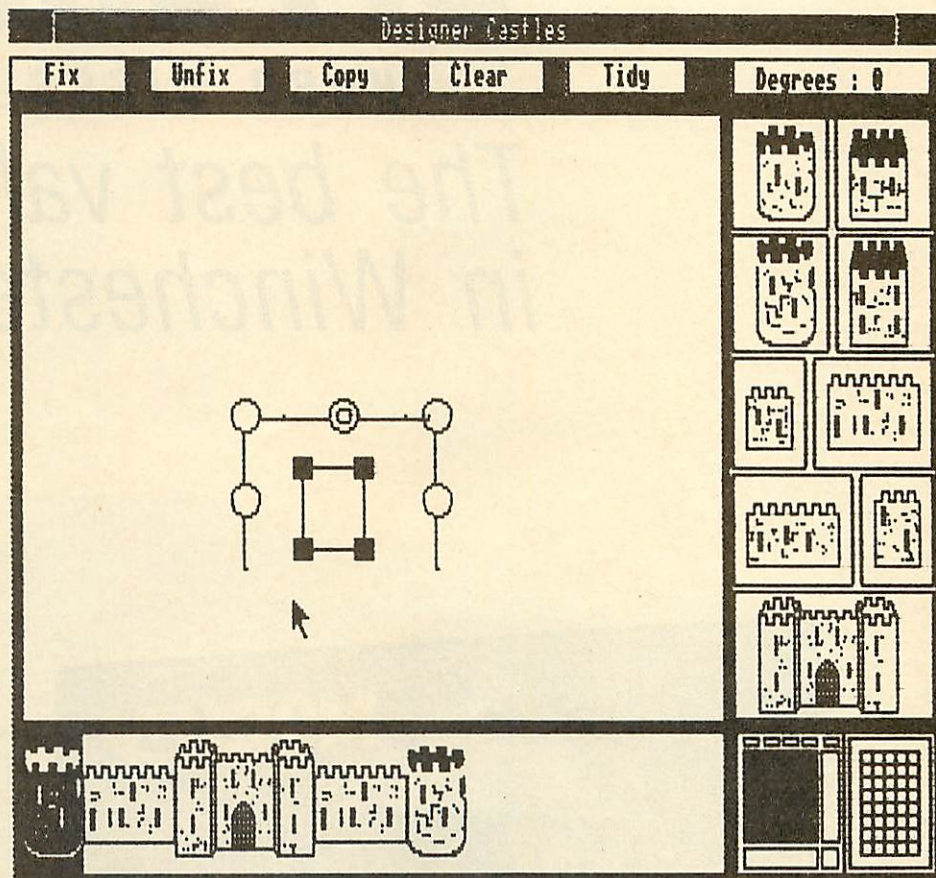


Figure 1. Elements of the castle are built up and then transferred to the main 'plan'

elements together, colour them appropriately, strengthen the structure, modify it or make it look like this or that castle?

The limitations for design problems are very broad, despite the apparent closed nature of the environment. In this respect, teachers need to experiment with the software themselves so that they may gain an impression of the breadth of possibilities as well as familiarise themselves with its facilities.

One final point is that castle files may be uploaded on to a TTNS database, where they are stored for public access. So, for instance, should you wish to have a replica of Dover castle without the bother of designing it, you may download some other school's effort and print it out straight away. Details about this may be had by typing Castles at the menu prompt on TTNS. Data Design may also be contacted on TTNS and welcome comments and suggestions.

Data Design has plans to create elements of a medieval village to complement the package. There also seems to be plenty of scope for designs of monasteries, manor houses, cathedrals and churches as well as such things as bridges, Greek temples, Roman villas and a whole wealth of other architectural, historical

and environmental topics. As is the case with all such software however, the further developments have to be funded by present sales and it is unlikely that all of the above will be tackled unless the software market changes radically. In many ways the publishers at Data Design have been their own worst enemies in that this excellent package is ridiculously priced. Indeed, further developments will be driven by the same printing software, and therefore the coming generations of this exciting software are likely to be even cheaper once you have bought the first package. This concept of using a central workhorse program as a common element for related packages is not new – AMS, for example, used it successfully with the AMX mouse programs. In this instance however, it is providing a design and discovery environment, the like of which has not been seen on a BBC micro in primary schools, and its use in secondary schools will undoubtedly help to cross those curricular boundaries which seem so impossible to bridge.

*Designer Castles (£30 + £1.60 postage, excluding VAT) from Data Design, Gowanbank, 3 Botham Hall Road, Longwood, Huddersfield HD3 4RJ. Tel: (0484) 653176. TTNS 01:YNK134*



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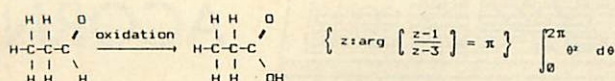
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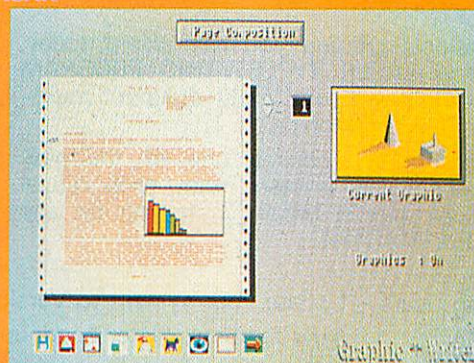
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# YELLOW PAGES

## COMPATIBILITY

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Listing 1		■	■	■	■	■	■	■	■	■	■	■

Note 1. Requires Sideways RAM. 2. Requires Wordwise Plus.

## HINTS & TIPS

See Hints & Tips, page 41

### Listing 1. Reflection

```

10 REM Reflection in X/Y axes
20 REM by Andrew Pepperell
30 REM for B/B+/E/M/C/A
40 REM (c) BAU March 1989
50 :
60 MODE 1
70 CX=0
80 FOR X%=-1280 TO 1280 STEP 80
90 GCOL 0,CX
100 CX=(CX+1) MOD 8
110 MOVE X%,0
120 MOVE X%+512,1024
130 PLOT 85,X%+80,0
140 PLOT 85,X%+80+512,1024
150 NEXT
160 PRINT TAB(5,5) "Reflect X"
170 PROCreflectx(160,600,448,900)
180 PRINT TAB(25,5) "Reflect Y"
190 PROCreflecty(800,600,1088,900)
200 END
210 :
220 DEF PROCreflectx(L%,B%,R%,T%)
230 LOCAL X%,Y%,CX,P%,D%
240 CX=(R%-L%) DIV 2
250 FOR Y%=B% TO T% STEP 4
260 FOR X%=L% TO R%+CX STEP 4
270 P%=POINT(X%,Y%)
280 D%=POINT(R%-X%+L%,Y%)
290 GCOL 0,P%
300 PLOT 69,R%-X%+L%,Y%
310 GCOL 0,D%
320 PLOT 69,X%,Y%
330 NEXT
340 NEXT
350 ENDPROC
360 :
370 DEF PROCreflecty(L%,B%,R%,T%)
380 LOCAL X%,Y%,CX,P%,D%
390 CX=(T%-B%) DIV 2
400 FOR X%=L% TO R% STEP 4
410 FOR Y%=B% TO B%+CX STEP 4
420 P%=POINT(X%,Y%)
430 D%=POINT(X%,T%-Y%+B%)
440 GCOL 0,P%
450 PLOT 69,X%,T%-Y%+B%
460 GCOL 0,D%
470 PLOT 69,X%,Y%
480 NEXT
490 NEXT
500 ENDPROC

```

### Listing 2. Cut & Paste

```

10 REM Cut and Paste
ROM
20 REM by Brian Ross
30 REM for E/M/C
40 REM (c) BAU March
1989
50 :
60 MODE 7
70 VDU 28,0,24,39,21
80 :
90 code%=&6000
100 osbyte=&FFF4
110 oswrch=&FFEE
120 osasci=&FFE3
130 :
140 vdust=&D0
150 oldes=&275
160 :
170 mode=&355
180 tcx=&318
190 tcy=&319
200 csp=&F6
210 :
220 PROCass
230 PROCcheck
240 PRINT "Press a key
to save 'cut'"
250 IF GET
260 OSCLI "SAVE cut 60
00 "+STR$~0X+" 8000 8000
"
```

Continued ►



# YELLOW PAGES

## HINTS & TIPS

### ◀ Cut & Paste continued

```

270 END
280 :
290 DEF PROCass
300 FOR X%=4 TO 6 STEP
2
310 P%=&B000
320 OX=codeX
330 OPT X%
340 .romstrt
350 EQUW 0
360 EQUW 0
370 JMP service
380 EQUW &82
390 EQUW (copyr-romstr
t)
400 EQUW 0
410 .message
420 EQUW 13
430 EQUW "Cut and Past
e"
440 EQUW 13
450 EQUW 0
460 .copyr
470 EQUW 0
480 EQUW "(C) 1988 Bri
an Ross"
490 EQUW 0
500 :
510 .service
520 PHA
530 STA temp
540 TXA
550 PHA
560 TYA
570 PHA
580 LDA temp
590 CMP #&15
600 BEQ poll
610 CMP #&09
620 BEQ help
630 CMP #&01
640 BEQ init
650 .exit
660 .anrts
670 PLA
680 TAY
690 PLA
700 TAX
710 PLA
720 RTS
730 :
740 .poll
750 JMP (pollvector)
760 :
770 .help
780 LDA (&F2),Y
790 CMP #13
800 BNE helpout
810 LDY #0
820 .hloop
830 LDA message,Y
840 BEQ helpout
850 JSR osasci
860 INY
870 JMP hloop
880 .helpout
890 JMP exit
900 :
910 .init
920 LDA #22
930 LDX #1
940 JSR osbyte
950 LDA #poll1 MOD 256

960 STA pollvector
970 LDA #poll1 DIV 256
980 STA pollvector+1
990 LDA #0
1000 STA cflag
1010 JMP exit
1020 :
1030 .poll1
1040 LDA #129
1050 LDX #&FF
1060 LDY #&FF
1070 JSR osbyte
1080 BCC return
1090 LDA #129
1100 LDX #&FE
1110 LDY #&FF
1120 JSR osbyte
1130 BCC return
1140 LDA #129
1150 LDX #&AC
1160 LDY #&FF
1170 JSR osbyte
1180 BCS cutout
1190 LDA #129
1200 LDX #&AB
1210 LDY #&FF
1220 JSR osbyte
1230 BCS pasteout
1240 .return
1250 JMP exit
1260 :
1270 .pasteout
1280 JMP pasteout1
1290 :
1300 .cutout
1310 LDA cflag
1320 BEQ cut
1330 JMP exit
1340 .cut
1350 LDA pollvector
1360 STA ststatus
1370 LDA pollvector+1
1380 STA ststatus+1
1390 LDA #anrts MOD 256
1400 STA pollvector
1410 LDA #anrts DIV 256
1420 STA pollvector+1
1430 JSR savexy
1440 JSR savewindows
1450 LDA #26
1460 JSR oswrch
1470 LDA #cbuff MOD 256
1480 STA csp
1490 LDA #cbuff DIV 256
1500 STA csp+1
1510 JSR sc_size
1520 LDY nxc
1530 DEY
1540 STY maxx
1550 LDY nyc
1560 DEY
1570 STY maxy
1580 LDA #0
1590 STA minx
1600 STA miny
1610 STA xpos
1620 STA ypos
1630 LDA #ASC"#"
1640 STA prc
1650 JSR move_cur
1660 LDA #31
1670 JSR oswrch
1680 LDA xpos

1690 STA minx
1700 STA ulx
1710 JSR oswrch
1720 LDA ypos
1730 STA miny
1740 STA uly
1750 JSR oswrch
1760 LDA #135
1770 JSR osbyte
1780 STX ulc
1790 LDA #ASC"#"
1800 JSR oswrch
1810 JSR move_cur
1820 LDA xpos
1830 STA lrx
1840 LDA ypos
1850 STA lry
1860 INC lrx
1870 INC lry
1880 LDA #31
1890 JSR oswrch
1900 LDA ulx
1910 JSR oswrch
1920 LDA uly
1930 JSR oswrch
1940 LDA ulc
1950 JSR oswrch
1960 LDA uly
1970 STA cuty
1980 .cut11
1990 LDA ulx
2000 STA cutx
2010 .cut12
2020 LDA #31
2030 JSR oswrch
2040 LDA cutx
2050 JSR oswrch
2060 LDA cuty
2070 JSR oswrch
2080 LDA #135
2090 JSR osbyte
2100 CPX #&80
2110 BCC notudc
2120 LDX #32
2130 .notudc
2140 TXA
2150 JSR cutstore
2160 INC cutx
2170 LDA cutx
2180 CMP lrx
2190 BNE cut12
2200 JSR cutel
2210 INC cuty
2220 LDA cuty
2230 CMP lry
2240 BNE cut11
2250 JSR cutet
2260 LDA #1
2270 STA cflag
2280 JSR getwindows
2290 JSR getxy
2300 LDA ststatus
2310 STA pollvector
2320 LDA ststatus+1
2330 STA pollvector+1
2340 JMP exit
2350 :
2360 .cutstore
2370 LDY #0
2380 STA (csp),Y
2390 INC csp
2400 BEQ ccover
2410 RTS

```

Continued ▶



# YELLOW PAGES

## HINTS & TIPS

### ◀ Cut & Paste continued

2420 .csover	3150 JMP end	3880 JSR oswrch
2430 INC csp+1	3160 .left	3890 LDA xpos
2440 RTS	3170 LDA xpos	3900 STA oldx
2450 :	3180 CMP minx	3910 LDA ypos
2460 .cutel	3190 BEQ leover	3920 STA oldy
2470 SEC	3200 DEC xpos	3930 JMP mcloop
2480 LDA csp	3210 .leover	3940 .end
2490 SBC #1	3220 JMP pr_char	3950 LDA #31
2500 STA csp	3230 .right	3960 JSR oswrch
2510 LDA csp+1	3240 LDA xpos	3970 LDA oldx
2520 SBC #0	3250 CMP maxx	3980 JSR oswrch
2530 STA csp+1	3260 BEQ riover	3990 LDA ypos
2540 TXA	3270 INC xpos	4000 JSR oswrch
2550 ORA #&80	3280 .riover	4010 LDA oldchar
2560 JSR cutstore	3290 JMP pr_char	4020 JSR oswrch
2570 RTS	3300 .down	4030 LDA oldess
2580 .cutet	3310 LDA ypos	4040 STA oldes
2590 LDA #&FF	3320 CMP maxy	4050 LDY #128
2600 JSR cutstore	3330 BEQ doover	4060 .d12
2610 RTS	3340 INC ypos	4070 LDX #0
2620 :	3350 .doover	4080 .d12a
2630 .move_cur	3360 JMP pr_char	4090 NOP
2640 LDA oldes	3370 .up	4100 NOP
2650 STA oldess	3380 LDA ypos	4110 NOP
2660 LDA #1	3390 CMP miny	4120 INX
2670 STA oldes	3400 BEQ upover	4130 BNE d12a
2680 LDA #31	3410 DEC ypos	4140 DEY
2690 JSR oswrch	3420 .upover	4150 BNE d12
2700 LDA xpos	3430 .pr_char	4160 RTS
2710 JSR oswrch	3440 LDA #0	4170 :
2720 LDA ypos	3450 STA mpflag	4180 .sc_size
2730 JSR oswrch	3460 LDA oldx	4190 LDA mode
2740 LDA #135	3470 CMP xpos	4200 AND #7
2750 JSR osbyte	3480 BEQ xsame	4210 TAY
2760 STX oldchar	3490 LDA #0	4220 LDA xtable,Y
2770 LDA prc	3500 STA mpflag	4230 STA nxc
2780 JSR oswrch	3510 JMP prov	4240 LDA ytable,Y
2790 LDA xpos	3520 .xsame	4250 STA nyc
2800 STA oldx	3530 LDA #1	4260 RTS
2810 LDA ypos	3540 STA mpflag	4270 :
2820 STA oldy	3550 .checky	4280 .xtable
2830 .mcloop	3560 LDA oldy	4290 EQU 80
2840 LDY #30	3570 CMP ypos	4300 EQU 40
2850 .rdkdel	3580 BEQ ysame	4310 EQU 20
2860 LDX #0	3590 LDA #0	4320 EQU 80
2870 .readkde	3600 STA mpflag	4330 EQU 40
2880 NOP	3610 JMP prov	4340 EQU 20
2890 NOP	3620 .ysame	4350 EQU 40
2900 NOP	3630 LDA #1	4360 EQU 40
2910 INX	3640 STA mpflag	4370 :
2920 BNE readkde	3650 .prov	4380 .ytable
2930 DEY	3660 LDA mpflag	4390 EQU 32
2940 BNE rdkdel	3670 BEQ prov2	4400 EQU 32
2950 LDA #15	3680 JMP mcloop	4410 EQU 32
2960 LDA #1	3690 .prov2	4420 EQU 25
2970 JSR osbyte	3700 LDA #31	4430 EQU 32
2980 .readkl	3710 JSR oswrch	4440 EQU 32
2990 LDA #&7A	3720 LDA oldx	4450 EQU 25
3000 JSR osbyte	3730 JSR oswrch	4460 EQU 25
3010 CPX #&FF	3740 LDA oldy	4470 :
3020 BEQ readkl	3750 JSR oswrch	4480 .nyc
3030 CPX #25	3760 LDA oldchar	4490 EQU 0
3040 BEQ left	3770 JSR oswrch	4500 .nxc
3050 CPX #121	3780 LDA #31	4510 EQU 0
3060 BEQ right	3790 JSR oswrch	4520 :
3070 CPX #41	3800 LDA xpos	4530 .pasteout1
3080 BEQ down	3810 JSR oswrch	4540 LDA cflag
3090 CPX #57	3820 LDA ypos	4550 CMP #1
3100 BEQ up	3830 JSR oswrch	4560 BEQ paste
3110 CPX #73	3840 LDA #135	4570 JMP return
3120 BEQ rrr	3850 JSR osbyte	4580 .paste
3130 JMP mcloop	3860 STX oldchar	4590 LDA pollvector
3140 .rrr	3870 LDA prc	4600 STA ststatus

Continued ▶



# YELLOW PAGES

## HINTS & TIPS

### ◀ Cut & Paste continued

```

4610 LDA pollvector+1
4620 STA ststatus+1
4630 LDA #vector MOD 25
6
4640 STA pollvector
4650 LDA #vector DIV 25
6
4660 STA pollvector+1
4670 LDA #cbuf MOD 256
4680 STA papo
4690 LDA #cbuf DIV 256
4700 STA papo+1
4710 JMP return
4720 :
4730 .vector
4740 LDA #&80
4750 LDY #&FF
4760 LDX #&FF
4770 JSR osbyte
4780 CPX #0
4790 BNE endpas
4800 JSR getpaste
4810 TXA
4820 CMP #&FF
4830 BEQ switchoff
4840 PHA
4850 AND #&7F
4860 JSR ikb
4870 PLA
4880 BPL endpas
4890 LDA #13
4900 JSR ikb
4910 .endpas
4920 JMP exit
4930 .switchoff
4940 LDA ststatus
4950 STA pollvector
4960 LDA ststatus+1
4970 STA pollvector+1
4980 LDA #0
4990 STA cflag
5000 LDA #&FF
5010 STA cbuf
5020 JMP endpas
5030 .getpaste
5040 LDA papo
5050 STA csp
5060 LDA papo+1
5070 STA csp+1
5080 LDY #0
5090 LDA (csp),Y
5100 TAX
5110 LDA papo
5120 CLC
5130 ADC #1
5140 STA papo
5150 LDA papo+1
5160 ADC #0
5170 STA papo+1
5180 RTS
5190 .ikb
5200 LDX #0
5210 TAY
5220 LDA #&8A
5230 JMP osbyte
5240 :
5250 .savexy
5260 LDA tcx
5270 STA tabx
5280 LDA tcy
5290 STA taby
5300 LDA vdust
5310 STA vduss
5320 DRA #2
5330 AND #&BF
5340 STA vdust
5350 RTS
5360 .getxy
5370 LDA #31
5380 JSR oswrch
5390 SEC
5400 LDA tabx
5410 SBC #308
5420 JSR oswrch
5430 SEC
5440 LDA taby
5450 SBC #308
5460 JSR oswrch
5470 LDA tabx
5480 STA tcx
5490 LDA taby
5500 STA tcy
5510 LDA vduss
5520 STA vdust
5530 RTS
5540 .savewindows
5550 LDY #0
5560 .swloop
5570 LDA #300,Y
5580 STA swstore,Y
5590 INY
5600 CPY #&10
5610 BNE swloop
5620 RTS
5630 :
5640 .getwindows
5650 LDY #0
5660 LDA #24
5670 JSR oswrch
5680 .gw1
5690 LDA swstore,Y
5700 JSR oswrch
5710 INY
5720 CPY #8
5730 BNE gw1
5740 LDA #28
5750 JSR oswrch
5760 .gw12
5770 LDA swstore,Y
5780 JSR oswrch
5790 INY
5800 CPY #&C
5810 BNE gw12
5820 LDA #29
5830 JSR oswrch
5840 .gw13
5850 LDA swstore,Y
5860 JSR oswrch
5870 INY
5880 CPY #&10
5890 BNE gw13
5900 RTS
5910 :
5920 .swstore
5930 EQU 0
5940 EQU 0
5950 EQU 0
5960 EQU 0
5970 EQU 0
5980 :
5990 .cutx
6000 EQU 0
6010 .cuty
6020 EQU 0
6030 .ulx
6040 EQU 0
6050 .uly
6060 EQU 0
6070 .ulc
6080 EQU 0
6090 .lrx
6100 EQU 0
6110 .lry
6120 EQU 0
6130 .ststatus
6140 EQU 0
6150 .cflag
6160 EQU 0
6170 .tabx
6180 EQU 0
6190 .taby
6200 EQU 0
6210 .vduss
6220 EQU 0
6230 .pollvector
6240 EQU 0
6250 .xpos
6260 EQU 0
6270 .ypos
6280 EQU 0
6290 .oldx
6300 EQU 0
6310 .oldy
6320 EQU 0
6330 .maxx
6340 EQU 0
6350 .minx
6360 EQU 0
6370 .maxy
6380 EQU 0
6390 .miny
6400 EQU 0
6410 .prc
6420 EQU 0
6430 .oldchar
6440 EQU 0
6450 .mpflag
6460 EQU 0
6470 .editsts
6480 EQU 0
6490 .oldess
6500 EQU 0
6510 .papo
6520 EQU 0
6530 .temp
6540 EQU 0
6550 .cbuf
6560 J
6570 NEXT
6580 ENDPROC
6590 :
6600 DEF PROCcheck
6610 TX=0
6620 FOR X%=code% TO 0%
6630 TX=TX+?X%
6640 NEXT
6650 IF TX<>&258D6 THEN
VDU 7:PRINT "Checksum e
rror - Please check list
ing":END
6660 ENDPROC

```



# YELLOW PAGES

## A R C A G O R A

See Arc Agora page 46

### Listing 1. Archiver

```

10 REM Agora - listing 1
20 REM Arc Archiver
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU March 1989
60 :
70 MODE 12
80 *ADFS
90 DIM q% &100,w% &100,d% &100,code%
&1000
100 PROCass
110 space%=(HIMEM-END)-&4000) DIV 2
120 DIM inw% space%+8,outw% space%+8
130 PRINT "BAU Archiver 1.0"
140 VDU 28,0,31,79,2
150 REPEAT
160 CLOSE# 0
170 VDU 7
180 PRINT "[A] - archive object"
190 PRINT "[R] - recover archived object"
200 PRINT "[Q] - quit"
210 PRINT "Please select option"
220 REPEAT
230 choice%=INSTR("AaRrQq",GET$) DIV 2
240 UNTIL choice%>0
250 IF choice%=1 PROCarchive
260 IF choice%=2 PROCrecover
270 UNTIL choice%=3
280 VDU 26,12
290 END
300 :
310 DEF PROCarchive
320 sourcedir%=FNgetdir("Which object
do you wish to archive?","adfs:4.$")
330 destdrive%=FNgetdrive("Archive to
which drive?")
340 try%=FNyn("Try to compact data")
350 t1%=TIME$
360 t2%=MID$(t1$,5,2)+MID$(t1$,8,3)+MI
D$(t1$,14,2)
370 disc%=1
380 PRINT ""
390 PROCprepout(destdrive%)
400 TIME=0
410 PROCdoobj(sourcedir%,0)
420 PROCb(255)
430 CLOSE# out%
440 CLS
450 PRINT "Object "sourcedir%" succe
ssfully archived."
460 ENDPROC
470 :
480 DEF PROCdoobj(o$,depth%)
490 LOCAL type%
500 SYS "OS_File",5,o$ TO type%
510 IF type%=1 PROCdofile(o%)
520 IF type%=2 PROCdodir(o%)
530 ENDPROC
540 :
550 DEF PROCdofile(f%)
560 LOCAL i%
570 LOCAL ERROR
580 ON ERROR LOCAL VDU 7:PRINT"Can't
archive file "f%" ("REPORT$)":RESTORE
ERROR:ENDPROC
590 PRINTSPC(depth%)FNlastbit(f%) " ";
600 SYS "OS_File",5,f% TO ,,!w%,w%!4,w
%!8,w%!12
610 PROCb(1)
620 PROCs(FNlastbit(f%))
630 PROCwriteblock(w%,16)
640 in%=OPENIN(f%)
650 compactable%=FALSE
660 IF w%!8<space% AND try% THEN
670 SYS "OS_GBPB",4,in%,inw%,w%!8
680 compactable%=FNcount(inw%,inw%+w%!
8,outw%,complen%)
690 ENDIF
700 IF compactable% THEN
710 PRINT "("INT(complen%/w%!8*100)%"
)"
720 COLOUR 3
730 COLOUR 7
740 PROCb(1)
750 !w%=complen%
760 PROCwriteblock(w%,4)
770 PROCwriteblock(outw%,complen%)
780 ELSE
790 PRINT
800 PTR# in%=0
810 PROCb(0)
820 bytesleft%=w%!8
830 WHILE bytesleft%>0
840 IF remain%=0 CLOSE#out%:PROCprepou
t(destdrive%)
850 chunk%=space%
860 IF chunk%>bytesleft% chunk%=bytesl
eft%
870 IF chunk%>remain% chunk%=remain%
880 SYS "OS_GBPB",4,in%,inw%,chunk%
890 SYS "OS_GBPB",2,out%,inw%,chunk%
900 bytesleft%-=chunk%
910 remain%-=chunk%
920 ENDWHILE
930 ENDIF
940 CLOSE# in%
950 RESTORE ERROR
960 ENDPROC
970 :
980 DEF PROCwriteblock(base%,bytesleft
%)
990 WHILE bytesleft%>0
1000 IF remain%=0 CLOSE#out%:PROCprepou
t(destdrive%)
1010 chunk%=space%
1020 IF chunk%>bytesleft% chunk%=bytesl
eft%
1030 IF chunk%>remain% chunk%=remain%
1040 SYS "OS_GBPB",2,out%,base%,chunk%
1050 base%+=chunk%
1060 bytesleft%-=chunk%
1070 remain%-=chunk%
1080 ENDWHILE
1090 ENDPROC
1100 :
1110 DEF PROCreadblock(base%,bytesleft%
)
1120 WHILE bytesleft%>0
1130 IF remain%=0 CLOSE#in%:PROCprepin(
sourcedrive%)
1140 chunk%=space%
1150 IF chunk%>bytesleft% chunk%=bytesl
eft%
1160 IF chunk%>remain% chunk%=remain%
1170 SYS "OS_GBPB",4,in%,base%,chunk%
1180 base%+=chunk%
1190 bytesleft%-=chunk%
1200 remain%-=chunk%
1210 ENDWHILE
1220 ENDPROC
1230 :
1240 DEF PROCdodir(d%)
1250 LOCAL n%,read%,i%
1260 COLOUR 6

```

Continued ►



# YELLOW PAGES

## A R C A G O R A

### ◀ Archiver continued

```

1270 PRINT SPC(depth%)"Directory: "d$
1280 COLOUR 7
1290 PROCb(2)
1300 IF depth%=0 PROCs(d$) ELSE PROCs(F
Nlastbit(d$))
1310 n%=0
1320 SYS "OS_GBPB",9,d$,q%,1,n%,&100,"*
" TO ,,,read%,n%
1330 IF read%=0 THEN
1340 PRINT "(Directory "d$" is empty)"
1350 ELSE
1360 WHILE n%>=0
1370 i%=0
1380 WHILE i%?q%>0
1390 i%+=1
1400 ENDWHILE
1410 i%?q%=13
1420 PROCdoobj(d$+"."+q%,depth%+1)
1430 SYS "OS_GBPB",9,d$,q%,1,n%,&100,"*
" TO ,,,,n%
1440 ENDWHILE
1450 ENDIF
1460 PROCb(3)
1470 ENDPROC
1480 :
1490 DEF FNgetdir(q$,def$)
1500 REPEAT
1510 PROCins(def$)
1520 PRINT q$;
1530 INPUT " "dir$
1540 WHILE ASC(dir$)=32
1550 dir$=MID$(dir$,2)
1560 ENDWHILE
1570 IF FNfiletype(dir$)=0 PRINT "Sorr
y, that object does not exist"
1580 UNTIL FNfiletype(dir$)=2
1590 =dir$
1600 :
1610 DEF FNgetdrive(q$,def$)
1620 PROCins(STR$(def$))
1630 PRINT q$;
1640 INPUT " "drive$
1650 WHILE ASC(drive$)=32
1660 dir$=MID$(drive$,2)
1670 ENDWHILE
1680 =VAL(drive$)
1690 :
1700 DEF FNfiletype(f$)
1710 LOCAL type%
1720 LOCAL ERROR
1730 ON ERROR LOCAL RESTORE ERROR:=0
1740 SYS "OS_File",5,f$ TO type%
1750 RESTORE ERROR
1760 =type%
1770 :
1780 DEF PROCprepout(destdrive%)
1790 REPEAT
1800 PROCprompt("Insert blank disc "+ST
R$(disc%)+ " in drive "+STR$(destdrive%))
1810 ready%=FNreadyout(destdrive%)
1820 IF ready%>0 THEN
1830 IF ready%<>&10BD3 THEN
1840 PRINT"Format disc - ";
1850 SYS "OS_CLI","FORMAT "+STR$(destdr
ive%)+ " D"
1860 ready%=FNreadyout(destdrive%)
1870 ENDIF
1880 ENDIF
1890 UNTIL ready%=TRUE
1900 SYS "ADFS_FreeSpace",": "+STR$(dest
drive%) TO remain%,freeblock%
1910 out%=OPENOUT("ADFS: "+STR$(destdri
ve%)+".$.Backup")

```

```

1920 SYS "OS_CLI","NameDisc : "+STR$(des
tdrive%)+ " "+t2$+ "/" +STR$(disc%)
1930 PROCs(t1$+ "/" +STR$(disc%))
1940 disc%+=1
1950 ENDPROC
1960 :
1970 DEF PROCprepin(sourcedrive%)
1980 REPEAT
1990 REPEAT
2000 PROCprompt("Insert archive disc "+
STR$(disc%)+ " in drive "+STR$(sourcedriv
e%))
2010 UNTIL FNreadyin(sourcedrive%)=TRUE
2020 remain%=EXT#in%
2030 ch%=FNs
2040 IF disc%=1 t1%=ch$
2050 UNTIL LEFT$(ch$,24)=LEFT$(t1$,24)
AND VAL(MID$(ch$,26))=disc%
2060 disc%+=1
2070 ENDPROC
2080 :
2090 DEF PROCprompt(p$)
2100 LOCAL y%
2110 y%=VPOS
2120 COLOUR 132
2130 PRINT p$;" and press RETURN";
2140 COLOUR 128
2150 VDU 7
2160 *FX 15
2170 REPEAT
2180 UNTIL GET=13
2190 PRINTTAB(0,y%)SPC(79)TAB(0,y%);
2200 ENDPROC
2210 :
2220 DEF FNreadyout(drive%)
2230 LOCAL ERROR
2240 ON ERROR LOCAL RESTORE ERROR:PROCr
eport:=ERR
2250 SYS "OS_CLI","-ADFS-MOUNT "+STR$(d
rive%)
2260 SYS "OS_GBPB",9,"ADFS: "+STR$(driv
e%)+".$.q%,1,0,&100,"*" TO ,,,obj%
2270 IF obj%>0 THEN
2280 IF FNyn("Disc is not blank - erase
contents") SYS "OS_CLI","Wipe ADFS: "+S
TR$(drive%)+".$.* RF~C~V"
2290 ENDIF
2300 SYS "OS_GBPB",9,"ADFS: "+STR$(driv
e%)+".$.q%,1,0,&100,"*" TO ,,,obj%
2310 RESTORE ERROR
2320 =(obj%=0)
2330 :
2340 DEF FNyn(q$)
2350 LOCAL yn%
2360 PRINT q$"? (Y/N) ";
2370 REPEAT
2380 yn%=INSTR(" YyNn",GET$) DIV 2
2390 UNTIL yn%>0
2400 IF yn%=1 PRINT "Yes" ELSE PRINT "N
o"
2410 =(yn%=1)
2420 :
2430 DEF FNreadyin(drive%)
2440 LOCAL ERROR
2450 ON ERROR LOCAL RESTORE ERROR:PROCr
eport:=ERR
2460 SYS "OS_CLI","-ADFS-MOUNT "+STR$(d
rive%)
2470 in%=OPENIN("ADFS: "+STR$(sourcedri
ve%)+".$.Backup")
2480 RESTORE ERROR
2490 =(in%>0)
2500 :

```

Continued ▶



# YELLOW PAGES

## A R C A G O R A

### ◀ Archiver continued

```

2510 DEF PROCs(%d%)
2520 PROCwriteblock(d%,LEN(%d%)+1)
2530 ENDPROC
2540 :
2550 DEF PROCb(?d%)
2560 PROCwriteblock(d%,1)
2570 ENDPROC
2580 :
2590 DEF FNlastbit(f%)
2600 LOCAL i%
2610 i%=LEN(f%)+1
2620 REPEAT
2630 i%-=1
2640 UNTIL i%=0 OR MID$(f%,i%,1)=". "
2650 =MID$(f%,i%+1)
2660 :
2670 DEF PROCass
2680 literal%=141:comped%=142:mini%=143
2690 start=0:end=1:dest=2:destend=3
2700 read=4:byte=5:compaddr=6:longest=7
2710 byte2=8:read2=9:compaddr2=10:besta
ddr=11
2720 word=12:sp=13:link=14:pc=15
2730 FOR pass%=0 TO 2 STEP 2
2740 P%=code%
2750 [OPT pass%
2760 .comp
2770 STMFD (sp)!,{dest}
2780 SUB destend,end,start
2790 ADD destend,dest,destend
2800 MOV read,start
2810 .countloop
2820 CMP dest,destend
2830 BGT finishedcomp
2840 CMP read,end
2850 BGE finishedcomp
2860 MOV longest,#0
2870 SUB compaddr,read,#255
2880 CMP compaddr,start
2890 MOVLTL compaddr,start
2900 .compareloop1
2910 LDRB byte,[read]
2920 .findfirst
2930 TST compaddr,#%11
2940 BEQ words
2950 LDRB byte2,[compaddr],#1
2960 CMP byte,byte2
2970 BNE findfirst
2980 B gotfirst
2990 .words
3000 LDR word,[compaddr],#1
3010 AND byte2,word,#255
3020 CMP byte,byte2
3030 BEQ gotfirst
3040 MOV word,word,LSR #8
3050 ADD compaddr,compaddr,#1
3060 AND byte2,word,#255
3070 CMP byte,byte2
3080 BEQ gotfirst
3090 MOV word,word,LSR #8
3100 ADD compaddr,compaddr,#1
3110 AND byte2,word,#255
3120 CMP byte,byte2
3130 BEQ gotfirst
3140 ADD compaddr,compaddr,#1
3150 CMP byte,word,LSR #8
3160 BNE words
3170 .gotfirst
3180 CMP compaddr,read
3190 BGE donecomp
3200 MOV compaddr2,compaddr
3210 ADD read2,read,#1
3220 .compareloop2
3230 CMP read2,end
3240 BGE notsame
3250 CMP compaddr2,read
3260 BGE notsame
3270 LDRB byte,[read2],#1
3280 LDRB byte2,[compaddr2],#1
3290 CMP byte,byte2
3300 BEQ compareloop2
3310 .notsame
3320 SUB read2,read2,read
3330 SUB read2,read2,#1
3340 CMP read2,longest
3350 MOVGT longest,read2
3360 SUBGT bestaddr,compaddr,#1
3370 B compareloop1
3380 .donecomp
3390 SUBS longest,longest,#3
3400 BMI nohope
3410 SUB byte,read,bestaddr
3420 CMP byte,#32
3430 BGE notmini
3440 CMP longest,#8
3450 BGE notmini
3460 MOV byte2,#mini%
3470 STRB byte2,[dest],#1
3480 ADD byte2,longest,byte,ASL #3
3490 STRB byte2,[dest],#1
3500 B nextread
3510 .notmini
3520 CMP longest,#0
3530 BEQ nohope
3540 MOV byte2,#comped%
3550 STRB byte2,[dest],#1
3560 STRB byte,[dest],#1
3570 STRB longest,[dest],#1
3580 .nextread
3590 ADD read,read,longest
3600 ADD read,read,#3
3610 B countloop
3620 .nohope
3630 LDRB byte,[read],#1
3640 CMP byte,#literal%
3650 CMPNE byte,#comped%
3660 CMPNE byte,#mini%
3670 BNE notspec
3680 MOV byte2,#literal%
3690 STRB byte2,[dest],#1
3700 .notspec
3710 STRB byte,[dest],#1
3720 B countloop
3730 .finishedcomp
3740 LDMFD (sp)!,{byte}
3750 SUB R0,dest,byte
3760 MOV pc,link
3770 :
3780 .expand
3790 CMP start,end
3800 MOVGE pc,link
3810 LDRB byte,[dest],#1
3820 CMP byte,#literal%
3830 BNE notliteral
3840 LDRB byte,[dest],#1
3850 .ordinary
3860 STRB byte,[start],#1
3870 B expand
3880 .notliteral
3890 CMP byte,#comped%
3900 BNE notcomped
3910 LDRB read2,[dest],#1
3920 LDRB longest,[dest],#1
3930 B wascomped
3940 .notcomped
3950 CMP byte,#mini%

```

Continued ▶



# YELLOW PAGES

## A R C A G O R A

### ◀ Archiver continued

```

3960 BNE ordinary
3970 LDRB byte,[dest],#1
3980 AND longest,byte,#%111
3990 MOV read2,byte,LSR #3
4000 .wascomped
4010 SUB compaddr,start,read2
4020 ADD longest,longest,#3
4030 .copy
4040 LDRB byte,[compaddr],#1
4050 STRB byte,[start],#1
4060 SUBS longest,longest,#1
4070 BNE copy
4080 B expand
4090 J:NEXT pass%
4100 ENDPROC
4110 :
4120 DEF FNcount(A%,B%,C%,RETURN comple
n%)
4130 complen%=USR(comp)
4140 =(complen%<w%!8)
4150 :
4160 DEF PROCrecover
4170 LOCAL ERROR
4180 ON ERROR LOCAL RESTORE ERROR:CLS:P
ROCReport:ENDPROC
4190 disc%=1
4200 sourcedrive%=FNgetdrive("Recover f
rom which drive?",0)
4210 PROCprepin(sourcedrive%)
4220 PRINT "Object was archived on: "t1
$
4230 dummy%=FNb
4240 topdir%=FNs
4250 dir%=FNgetdir("Restore to where?",
topdir%)
4260 PRINT''
4270 depth%=0
4280 REPEAT
4290 type%=FNb
4300 CASE type% OF
4310 WHEN 1:
4320 f$=dir$+"."+FNs
4330 load%=FNw
4340 exec%=FNw
4350 len%=FNw
4360 attrib%=FNw
4370 COLOUR 7
4380 PRINT SPC(depth%)FNlastbit(f$);" "
4390 compacted%=(FNb=1)
4400 IF compacted% THEN
4410 IF len%>space% ERROR 17,"Insuffici
ent workspace to recover '"+f$+"'"
4420 complen%=FNw
4430 PROCreadblock(inw%,complen%)
4440 A%=outw%
4450 B%=outw%+len%
4460 C%=inw%
4470 CALL expand
4480 SYS "OS_File",0,f$,,outw%,outw%+1
en%
4490 ELSE
4500 out%=OPENOUT(f$)
4510 bytesleft%=len%
4520 WHILE bytesleft%>0
4530 IF remain%=0 CLOSE# in%:PROCprepin
(sourcedrive%)
4540 chunk%=space%
4550 IF chunk%>bytesleft% chunk%=bytesl
eft%
4560 IF chunk%>remain% chunk%=remain%
4570 SYS "OS_GBPB",4,in%,outw%,chunk%
4580 SYS "OS_GBPB",2,out%,outw%,chunk%
4590 bytesleft%-=chunk%
4600 remain%-=chunk%
4610 ENDWHILE
4620 CLOSE# out%
4630 ENDIF
4640 SYS "OS_File",1,f$,load%,exec%,,at
trib%
4650 WHEN 2:
4660 dir%=dir$+"."+FNs
4670 COLOUR 6
4680 PRINT SPC(depth%) "Directory: "FNla
stbit(dir%)
4690 SYS "OS_CLI","CDIR "+dir$
4700 SYS "OS_CLI","DIR "+dir$
4710 depth%+=1
4720 WHEN 3:
4730 *UP
4740 dir%=FNfirstbit(dir%)
4750 depth%-=1
4760 ENDCASE
4770 UNTIL type%=255
4780 CLOSE# in%
4790 CLS
4800 PRINT "Object '"+topdir$ "' successf
ully recovered.""
4810 RESTORE ERROR
4820 ENDPROC
4830 :
4840 DEF FNb
4850 LOCAL i%,s%,n%
4860 s$=""
4870 REPEAT
4880 n%=FNb
4890 IF n%<>13 s$=s$+CHR$(n%)
4900 UNTIL n%=13
4910 =s$
4920 :
4930 DEF FNfirstbit(f$)
4940 LOCAL i%
4950 i%=LEN(f$)+1
4960 REPEAT
4970 i%-=1
4980 UNTIL i%=0 OR MID$(f$,i%,1)=". "
4990 =LEFT$(f$,i%-1)
5000 :
5010 DEF FNw
5020 LOCAL i%
5030 FOR i%=0 TO 3
5040 i%?w%=FNb
5050 NEXT
5060 =!w%
5070 :
5080 DEF FNb
5090 IF remain%=0 CLOSE# in%:PROCprepin
(sourcedrive%)
5100 remain%-=1
5110 =BGET# in%
5120 :
5130 DEF PROCReport
5140 COLOUR 1
5150 PRINT "ERROR: "REPORT$''
5160 COLOUR 7
5170 ENDPROC
5180 :
5190 DEF PROCins(s%)
5200 LOCAL i%
5210 FOR i%=1 TO LEN(s%)
5220 SYS "OS_Byte",138,0,ASC(MID$(s%,i%
))
5230 NEXT
5240 ENDPROC

```



# YELLOW PAGES

## SIDEWAYS RAM

### Listing 2. Pathname

```

10 REM Agora - listin
g 2
20 REM Pathname finde
r
30 REM by Dave Lawren
ce
40 REM for Archimedes
only
50 REM (c) BAU March
1989
60 :
70 byte=0:to=1:from=2
: len=4
80 space=11:num=12
90 sp=13:link=14:pc=1
5
100 DIM code% 1000
110 FOR pass%=4 TO 6 S
TEP 2
120 P%=0:O%=code%
130 OPT pass%
140 EQU 0
150 EQU 0
160 EQU 0
170 EQU 0
180 EQU titlestring
190 EQU helpstring
200 EQU helptable
210 EQU 0
220 EQU 0
230 EQU 0
240 EQU 0
250 :
260 .titlestring
270 EQU "BroomCupboar
d"
280 EQU 0
290 :
300 .helpstring
310 EQU "BroomCupboar
d"
320 EQU 9
330 EQU "1.00 ("
340 EQU MID$(TIME$,5,
11)
350 EQU ")"
360 EQU 0
370 :
380 .helptable
390 EQU "PathName"
400 EQU 0
410 ALIGN
420 EQU path
430 EQU &00010100
440 EQU pathsyn
450 EQU pathhelp
460 :
470 EQU 0
480 :
490 .pathhelp
500 EQU "PathName sh
ows the full pathname of
the currently selected
(or specified) directory
."
510 EQU 13
520 .pathsyn
530 EQU "Syntax: *Pat
hName [<dir>]"
540 EQU 0
550 ALIGN
560 :
570 .path
580 STMF (sp),{link}
590 MOV space,R0
600 MOV num,R1
610 MOV R0,#6
620 MOV R3,#&200
630 SWI "OS_Module"
640 BVC gotsome
650 ADR R0,panic
660 LDMF (sp),{pc}
670 .panic
680 EQU 17
690 EQU "Couldn't cla
im workspace"
700 EQU 0
710 ALIGN
720 .gotsome
730 CMP num,#0
740 BEQ nodir
750 MOV R0,#0
760 MOV R1,space
770 SWI "XOS_FSControl"
780 BVS return
790 .nodir
800 MOV space,from
810 MOV num,#0
820 .repeat
830 MOV byte,#6
840 SWI "OS_GBPB"
850 LDRB len,[from,#1]
860 BL copy
870 CMP byte,ASC"%"
880 MOV byte,ASC"."
890 STMF (sp),{byte}
900 ADD num,num,#1
910 BEQ end
920 ADR R0,up
930 SWI "OS_CLI"
940 B repeat
950 .end
960 MOV byte,#5
970 SWI "OS_GBPB"
980 LDRB len,[from]
990 BL copy
1000 MOV byte,ASC": "
1010 STMF (sp),{byte}
1020 ADD num,num,#1
1030 MOV to,space
1040 .pullover
1050 LDMF (sp),{byte}
1060 STRB byte,[to],#1
1070 SWI "OS_WriteC"
1080 SUBS num,num,#1
1090 BNE pullover
1100 SWI "OS_NewLine"
1110 MOV byte,#13
1120 STRB byte,[to],#1
1130 MOV R0,#0
1140 MOV R1,space
1150 SWI "OS_FSControl"
1160 .return
1170 MOV byte,#7
1180 MOV R2,space
1190 SWI "OS_Module"
1200 LDMF (sp),{pc}
1210 :
1220 .copy
1230 CMP len,#0
1240 BNE oktocopy
1250 STMF (sp),{R1-R2
,link}
1260 SWI "ADFS_Drives"
1270 LDMF (sp),{R1-R2
,link}
1280 ADD R0,R0,#48
1290 STMF (sp),{byte}
1300 ADD num,num,#1
1310 MOV pc,link
1320 .oktocopy
1330 ADD from,from,len
1340 .copyname
1350 LDRB byte,[from],#
-1
1360 STMF (sp),{byte}
1370 ADD num,num,#1
1380 SUBS len,len,#1
1390 CMP len,#1
1400 BGE copyname
1410 MOV pc,link
1420 :
1430 .up
1440 EQU "UP"
1450 EQU 13
1460 J: NEXT pass%
1470 OSCLI("Save Cupboa
rd "+STR$~code%+" "+STR$
~O%)
1480 *SetType Cupboard
FFA
1490 PRINT "Current path
name is: ";
1500 *RMLoad Cupboard
1510 *PathName
1520 END

```

### See Hit & RAM, page 66

```

10 REM Basic/Wordwise
-Plus Swap
20 REM by David Harpe
r
30 REM for BBC B/B+/M
/C with SW RAM, Basic II
(and Wordwise-Plus)
40 REM (c) BAU March
1989
50 :
60 addr=&B0
70 fileadd=&B2:buffad
d=&B4
80 :
90 DATA B2
100 DATA BASIC / WORDW
ISE-PLUS Swap
110 DATA 0
120 DATA 14th July 198
B
130 DATA 1,SWAP,swap
140 DATA 2
150 DATA 1,break,6,ise
rror
160 DATA 5
170 DATA E,newwrchv,10
,newrdchv

```

Continued ►



# YELLOW PAGES

## SIDEWAYS RAM

### Hit & RAM continued

```

180 DATA 12,newfilev,1
4,newargsv
190 DATA 1C,newfindv
200 DATA 500,SWAP
210 :
220 READ type$:type%=E
VAL("&"+type%)
230 READ title$,versio
n$,copyrt$
240 READ numkeywds%
250 IF numkeywds%>0:PR
OCreadkw
260 READ numsc%
270 IF numsc%>0:PROCre
adsc
280 READ numvects%
290 IF numvects%>0:PRO
Creadxv
300 READ cdsizes%
310 cdsizes%=EVAL("&"+c
dsizes%)
320 READ filename$
330 :
340 DIM code% cdsizes%
350 zp=&A8
360 osbyte=&FFFF
370 oswrch=&FFEE:osnew
1=&FFE7
380 FOR pass%=4 TO 6 S
TEP 2
390 PROCassemble
400 NEXT
410 PRINT "code locati
on:"
420 PRINT " ";~c
ode%"; " ";~0%
430 PRINT "File size =
&";
440 PRINT ";~0%-code%";
bytes"
450 PRINT "Save machi
ne code? (Y/N) ";
460 REPEAT
470 A$=GET$
480 UNTIL INSTR("NnYy"
,A$)>0
490 PRINT A$
500 IF INSTR("Yy",A$)>
0:PROCsav
510 END
520 :
530 DEF PROCsave
540 OSCLI("SAVE "+file
name$+" "+STR$~code%+CHR
$32+STR$~0%+" 0 8000")
550 ENDPROC
560 :
570 DEF PROCreadkw
580 DIM keywd$(numkeyw
ds%)
590 DIM actnadd$(numke
yws%)
600 FOR N%=1 TO numkey
wds%
610 READ keywd$(N%),ac
tnadd$(N%)
620 NEXT
630 ENDPROC
640 :
650 DEF PROCreadsc
660 DIM servcalls$(num
sc%)
670 DIM servadd$(numsc
%)
680 FOR N%=1 TO numsc%
690 READ servcalls$,se
rvadd$(N%)
700 servcalls$(N%)=EVA
L("&"+servcalls%)
710 NEXT
720 ENDPROC
730 :
740 DEF PROCreadxv
750 DIM pg2loc$(numvec
ts%)
760 DIM vectadd$(numve
cts%)
770 FOR N%=1 TO numvec
ts%
780 READ pg2loc$
790 pg2loc$(N%)=EVAL("
&"+pg2loc%)
800 READ vectadd$(N%)
810 NEXT
820 ENDPROC
830 :
840 DEF PROCkwcode
850 IOPT pass%
860 CMP #4
870 BEQ P%+5
880 JMP other
890 JSR recog
900 TAX
910 BPL P%+5
920 JMP regain
930 ASL A
940 TAX
950 LDA actntable,X
960 STA doactn+1
970 LDA actntable+1,X
980 STA doactn+2
990 .doactn
1000 JSR &FFFF
1010 TSX
1020 LDA #0
1030 STA &103,X
1040 JMP regain
1050 :
1060 .recog
1070 LDA #0
1080 STA recflag
1090 TYA
1100 CLC
1110 ADC &F2
1120 STA command+1
1130 LDA &F3
1140 ADC #0
1150 STA command+2
1160 LDA #keywds MOD 25
6
1170 STA compare+1
1180 LDA #keywds DIV 25
6
1190 STA compare+2
1200 .reclp
1210 LDX #0
1220 .compare
1230 LDA &FFFF,X
1240 BMI unrecogd
1250 BEQ match
1260 STA temp
1270 .command
1280 LDA &FFFF,X
1290 CMP #ASC"."
1300 BEQ match
1310 AND #&DF
1320 CMP temp
1330 BNE nomatch
1340 INX
1350 BNE compare
1360 .match
1370 LDA recflag
1380 RTS
1390 .unrecogd
1400 LDA #&FF
1410 RTS
1420 .nomatch
1430 INC recflag
1440 LDA compare+1
1450 STA compon+1
1460 LDA compare+2
1470 STA compon+2
1480 .compon
1490 LDA &FFFF,X
1500 BEQ endword
1510 INX
1520 BNE compon
1530 .endword
1540 SEC
1550 TXA
1560 ADC compare+1
1570 STA compare+1
1580 BCC reclp
1590 INC compare+2
1600 BCS reclp
1610 .recflag
1620 EQU 0
1630 J
1640 keywds=P%
1650 FOR N%=1 TO numkey
wds%
1660 KW=keywd$(N%)
1670 $0%KW%
1680 0%0%LENKW%+1:P%=
P%+LENKW%+1
1690 ?(0%-1)=0
1700 NEXT
1710 ?0%=&FF:0%=0%+1:P%
=P%+1
1720 actntable=P%
1730 P%=P%+numkeywds%*2
1740 FOR N%=1 TO numkey
wds%
1750 IF pass% AND 2:!0%
=EVAL(actnadd$(N%))
1760 0%=0%+2
1770 NEXT
1780 ENDPROC
1790 :
1800 DEF PROCclaimcode
1810 IOPT pass%
1820 .claim
1830 LDA #&FF
1840 STA clflag
1850 BMI clmunc1m
1860 :
1870 .unclaim
1880 LDA #0
1890 STA clflag
1900 :
1910 .clmunc1m
1920 LDA #&A8
1930 LDX #0
1940 LDY #&FF
1950 JSR osbyte
1960 STX zp
1970 STY zp+1
1980 LDA #numvects%-1
1990 STA vectno

```

Continued ▶



# YELLOW PAGES

## SIDEWAYS RAM

### ◀ Hit & RAM continued

2000 .claimlp	2730 STA (zp),Y	3300 PHA
2010 LDX vectno	2740 RTS	3310 TYA
2020 LDY pg2offsets,X	2750 :	3320 PHA
2030 TXA	2760 J	3330 TSX
2040 ASL A	2770 pg2offsets=P%	3340 LDA &103,X
2050 TAX	2780 pgdoffsets=P%+numv	3350 CMP #9
2060 JSR transfer2	ects%	3360 BNE NotHelp
2070 INX	2790 NewVects=P%+numvec	3370 LDA (&F2),Y
2080 INY	ts%#2	3380 CMP #&D
2090 JSR transfer2	2800 oldvects=P%+numvec	3390 BNE regain
2100 LDX vectno	ts%#5	3400 JSR osnewl
2110 LDY pgdoffsets,X	2810 oldxvects=P%+numve	3410 LDX #0
2120 TXA	cts%#7	3420 .Prtlp
2130 ASL A	2820 P%=P%+numvects%#10	3430 LDA title,X
2140 ADC vectno	2830 FOR N%=1 TO numvec	3440 BEQ Prted
2150 TAX	ts%	3450 JSR oswrch
2160 LDA #0	2840 ?0%=pg2loc%(N%):0%	3460 INX
2170 STA putsloflag	=0%+1	3470 BNE Prtlp
2180 JSR transferd	2850 NEXT	3480 .Prted
2190 INY	2860 FOR N%=1 TO numvec	3490 JSR osnewl
2200 INX	ts%	3500 :
2210 JSR transferd	2870 ?0%=(pg2loc%(N%)DI	3510 .regain
2220 INY	V2)*3:0%=0%+1	3520 PLA
2230 INX	2880 NEXT	3530 TAY
2240 DEC putsloflag	2890 FOR N%=1 TO numvec	3540 PLA
2250 JSR transferd	ts%	3550 TAX
2260 DEC vectno	2900 IF pass% AND 2: !0%	3560 PLA
2270 BPL claimlp	=EVAL(vectadd\$(N%))	3570 RTS
2280 RTS	2910 0%=0%+3	3580 :
2290 .clflag	2920 NEXT	3590 .ThisSlot
2300 EQU B 0	2930 0%=0%+numvects%#5	3600 EQU B 0
2310 .vectno	2940 ENDPROC	3610 .temp
2320 EQU B 0	2950 :	3620 EQU B 0
2330 .putsloflag	2960 DEF PROCService	3630 :
2340 EQU B 0	2970 FOR N%=1 TO numsc%	3640 .NotHelp
2350 :	2980 !OPT pass%	3650 J
2360 .transfer2	2990 CMP #servcalls%(N%	3660 IF numkeywds%=0:[0
2370 BIT clflag	)	PT pass%:JMP other:]:ELS
2380 BPL uncl2	3000 BNE P%+B	E:PROCkwcode
2390 LDA &200,Y	3010 J	3670 IF numvects%>0:PRO
2400 STA oldvects,X	3020 IF pass% AND 2:[OP	Cclaimcode
2410 TYA	T pass%:JSR EVALservadd\$	3680 other=P%
2420 BIT one	(N%):]:ELSE:P%=P%+3:0%=0	3690 IF numsc%>0:PROCSe
2430 BEQ evenY	%+3	rvcode
2440 LDA #&FF	3030 !OPT pass%	3700 :
2450 BMI storbyte	3040 JMP regain	3710 !OPT pass%
2460 .evenY	3050 J	3720 JMP regain
2470 STA temp	3060 NEXT	3730 :
2480 LSR A	3070 ENDPROC	3740 .error
2490 ADC temp	3080 :	3750 PLA
2500 .storbyte	3090 DEF PROCassemble	3760 STA Errptr+1
2510 STA &200,Y	3100 P%=&B000:0%=code%	3770 PLA
2520 RTS	3110 :	3780 STA Errptr+2
2530 .uncl2	3120 !OPT pass%	3790 LDX #0
2540 LDA oldvects,X	3130 EQUW 0:EQU B 0	3800 .Errlp
2550 STA &200,Y	3140 \or "JMP Languag	3810 INX
2560 RTS	e" if type%=&C2	3820 .Errptr
2570 .one	3150 JMP Service	3830 LDA &FFFF,X
2580 EQU B 1	3160 EQU B type%	3840 STA &100,X
2590 :	3170 EQU B copyrt-&B000	3850 BNE Errlp
2600 .transferd	3180 EQU B version%	3860 LDA #0
2610 BIT clflag	3190 .title	3870 STA &100
2620 BPL uncl2	3200 EQU B title\$	3880 JMP &100
2630 LDA (zp),Y	3210 .copyrt	3890 :
2640 STA oldxvects,X	3220 EQU B 0	10000 .break
2650 LDA NewVects,X	3230 EQU B "(C) "+copyrt	10010 LDA #0
2660 BIT putsloflag	\$	10020 STA onoff
2670 BPL P%+5	3240 EQU B 0	10030 RTS
2680 LDA ThisSlot	3250 :	10040 :
2690 STA (zp),Y	3260 .Service	10050 .iserror
2700 RTS	3270 STX ThisSlot	10060 BIT onoff
2710 .uncl2	3280 PHA	10070 BPL P%+5
2720 LDA oldxvects,X	3290 TXA	10080 JSR reset

Continued ▶



# YELLOW PAGES

## SIDEWAYS RAM

### ◀ Hit & RAM continued

10090 RTS	10740 EQUW 0	11470 BPL startnumlp
10100 :	10750 .ignore	11480 JSR startline
10110 .swap	10760 EQUW 0	11490 JMP reenterrd
10120 LDA #&FF	10770 .ext	11500 .stopread
10130 STA onoff	10780 EQUW 0	11510 TYA
10140 LDA #&CB	10790 .onoff	11520 PHA
10150 LDX #1	10800 EQUW 0	11530 JSR reset
10160 LDY #2	10810 .temp	11540 PLA
10170 JSR osbyte	10820 EQUW 0	11550 TAY
10180 JSR claim	10830 :	11560 LDA #&D
10190 LDA #&FC	10840 .BtoWst	11570 JMP outread
10200 JSR osbyteread	10850 EQUW "LISTO 0"	11580 :
10210 STX temp	10860 EQUW &D	11590 .read
10220 LDA #&BB	10870 EQUW "LIST"	11600 LDA &FFFF
10230 JSR osbyteread	10880 EQUW &D	11610 BEQ stopread
10240 CPX temp	10890 EQUW "WORDWISE"	11620 INC read+1
10250 BNE inWW	10900 EQUW &D	11630 BNE P%+5
10260 :	10910 EQUW "NEW"	11640 INC read+2
10270 LDY #0	10920 EQUW &D	11650 CMP #&D
10280 STY ignore	10930 EQUW "2"	11660 BNE outread
10290 DEY	10940 EQUW &D	11670 LDX #3
10300 STY btowflag	10950 EQUW "*"	11680 .nxnumlp
10310 STY wrchon	10960 EQUW &D	11690 INC number,X
10320 LDY #&FD	10970 :	11700 LDA number,X
10330 STY promptcount	10980 .WtoBst	11710 CMP #&3A
10340 LDY #&FA	10990 EQUW "11"	11720 BNE numset
10350 STY leadcount	11000 EQUW &D	11730 LDA #&30
10360 LDA #buffer MOD 25	11010 EQUW "BASIC"	11740 STA number,X
6	11020 EQUW &D	11750 DEX
10370 STA send+1	11030 :	11760 BPL nxnumlp
10380 LDA #buffer DIV 25	11040 .num10	11770 .numset
6	11050 EQUW "00010"	11780 JSR startline
10390 STA send+2	11060 EQUW 0	11790 LDX temp
10400 LDA #BtoWst MOD 25	11070 :	11800 LDA #&D
6	11080 .number	11810 CLC
10410 STA fetch+1	11090 EQUW 0	11820 RTS
10420 LDA #BtoWst DIV 25	11100 EQUW 0	11830 :
6	11110 :	11840 .startline
10430 STA fetch+2	11120 .newrdchv	11850 LDX #&FF
10440 RTS	11130 STX temp	11860 STX rdnumflag
10450 :	11140 LDA btowflag	11870 LDA #number MOD 25
10460 .inWW	11150 BMI fetch	6
10470 LDY #0	11160 .reenterrd	11880 STA fetch+1
10480 STY btowflag	11170 LDA cplxflag	11890 LDA #number DIV 25
10490 STY wrchon	11180 BEQ fetch	6
10500 STY cplxflag	11190 LDA rdnumflag	11900 STA fetch+2
10510 DEY	11200 BEQ read	11910 RTS
10520 STY rdnumflag	11210 .fetch	11920 :
10530 LDA #buffer MOD 25	11220 LDA &FFFF	11930 .newwrchv
6	11230 BEQ finread	11940 STX temp
10540 STA read+1	11240 INC fetch+1	11950 BIT wrchon
10550 LDA #buffer DIV 25	11250 BNE P%+5	11960 BPL nosend
6	11260 INC fetch+2	11970 CMP #&A
10560 STA read+2	11270 .outread	11980 BEQ nosend
10570 LDA #WtoBst MOD 25	11280 LDX temp	11990 CMP #&D
6	11290 CLC	12000 BNE ntcarrret
10580 STA fetch+1	11300 RTS	12010 ROL ignore
10590 LDA #WtoBst DIV 25	11310 .finread	12020 LDX #0
6	11320 LDA btowflag	12030 STX ignore
10600 STA fetch+2	11330 BMI stopread	12040 LDX #&FA
10610 RTS	11340 LDX #&FF	12050 STX leadcount
10620 :	11350 LDA cplxflag	12060 BCS nosend
10630 .btowflag	11360 STX cplxflag	12070 BCC send
10640 EQUW 0	11370 BPL startnums	12080 .ntcarrret
10650 .cplxflag	11380 INX	12090 BIT ignore
10660 EQUW 0	11390 STX rdnumflag	12100 BMI nosend
10670 .wrchon	11400 BEQ reenterrd	12110 .consider
10680 EQUW 0	11410 .startnums	12120 LDX leadcount
10690 .rdnumflag	11420 LDX #4	12130 BPL send
10700 EQUW 0	11430 .startnumlp	12140 CMP #ASC">"
10710 .leadcount	11440 LDA num10,X	12150 BNE ntprompt
10720 EQUW 0	11450 STA number,X	12160 DEC ignore
10730 .promptcount	11460 DEX	12170 INC promptcount

Continued ▶



# YELLOW PAGES

## GRAPHICS

### ◀ Hit & RAM continued

12180 BNE nosend	12770 INY	13400 BVS toolong
12190 SEC	12780 LDA ext+1	13410 LDY addr+1
12200 LDA send+1	12790 STA (addr),Y	13420 LDX addr
12210 SBC #buffer MOD 25	12800 INY	13430 RTS
6	12810 LDA #0	13440 :
12220 STA ext	12820 STA (addr),Y	13450 .badchar
12230 LDA send+2	12830 INY	13460 JSR error
12240 SBC #buffer DIV 25	12840 STA (addr),Y	13470 EQU 90
6	12850 LDY addr+1	13480 EQU "Illegal char
12250 STA ext+1	12860 LDX addr	acter"
12260 LDA #0	12870 LDA #1	13490 EQU 0
12270 STA wrchon	12880 RTS	13500 :
12280 JSR send	12890 :	13510 .toolong
12290 BIT send+2	12900 .save	13520 JSR error
12300 BVC PX+5	12910 LDY #&A	13530 EQU 91
12310 JMP toolong	12920 LDA (addr),Y	13540 EQU "Program too
12320 LDA #ASC">"	12930 STA fileadd	long"
12330 BNE nosend	12940 INY	13550 EQU 0
12340 .ntprompt	12950 LDA (addr),Y	13560 :
12350 INC leadcount	12960 STA fileadd+1	13570 .newargsv
12360 BMI nosend	12970 LDY #&E	13580 CPY #0
12370 .send	12980 SEC	13590 BNE findext
12380 STA &FFFF	12990 LDA (addr),Y	13600 LDA #4
12390 INC send+1	13000 SBC fileadd	13610 RTS
12400 BNE PX+5	13010 TAX	13620 .findext
12410 INC send+2	13020 INY	13630 PHA
12420 .nosend	13030 LDA (addr),Y	13640 LDA ext
12430 LDX temp	13040 SBC fileadd+1	13650 STA 0,X
12440 RTS	13050 STA temp	13660 LDA ext+1
12450 :	13060 LDY #0	13670 STA 1,X
12460 .newfilev	13070 TXA	13680 LDA #0
12470 STX addr	13080 BNE savelp	13690 STA 2,X
12480 STY addr+1	13090 DEC temp	13700 STA 3,X
12490 TAX	13100 BMI endsave	13710 PLA
12500 LDA #buffer MOD 25	13110 .savelp	13720 RTS
6	13120 LDA (fileadd),Y	13730 :
12510 STA buffadd	13130 BMI badchar	13740 .newfindv
12520 LDA #buffer DIV 25	13140 CMP #10	13750 CMP #0
6	13150 BCC badchar	13760 BEQ outfindv
12530 STA buffadd+1	13160 STA (buffadd),Y	13770 LDA btowflag
12540 TXA	13170 INY	13780 AND #&20
12550 BEQ save	13180 BNE uppersame	13790 .outfindv
12560 :	13190 INC buffadd+1	13800 RTS
12570 LDY #2	13200 INC fileadd+1	13810 :
12580 LDA (addr),Y	13210 .uppersame	13820 .reset
12590 STA fileadd	13220 DEX	13830 LDA #0
12600 INY	13230 BNE savelp	13840 STA onoff
12610 LDA (addr),Y	13240 DEC temp	13850 JSR unclaim
12620 STA fileadd+1	13250 BPL savelp	13860 LDA #&C8
12630 LDY #0	13260 .endsave	13870 LDX #0
12640 .loadlp	13270 LDA #&D	13880 LDY #2
12650 LDA (buffadd),Y	13280 STA (buffadd),Y	13890 JMP osbyte
12660 BEQ finload	13290 INY	13900 :
12670 STA (fileadd),Y	13300 BNE PX+4	13910 .osbyteread
12680 INY	13310 INC buffadd+1	13920 LDX #0
12690 BNE loadlp	13320 LDA #0	13930 LDY #&FF
12700 INC buffadd+1	13330 STA (buffadd),Y	13940 JMP osbyte
12710 INC fileadd+1	13340 CLC	13950 :
12720 BNE loadlp	13350 TYA	13960 .buffer
12730 .finload	13360 ADC buffadd	13970 :
12740 LDY #&A	13370 BCC PX+4	13980 1
12750 LDA ext	13380 INC buffadd+1	13990 ENDPROC
12760 STA (addr),Y	13390 BIT buffadd+1	

See The Hodgepodge machine, page 78

10 REM The HODGEPODGE machine  
20 REM by Andrew Green  
30 REM for Archimedes only  
40 REM (c) BAU March 1989  
50 :

60 ON ERROR PROCInterrupt  
70 PROCInitialise  
80 PROCprocess  
90 END  
100 :

Continued ▶



# YELLOW PAGES

## G R A P H I C S

### ◀ Hodgepodge continued

```

110 DEF PROCInterrupt
120 VDU 6
130 *FX 112,0
140 *FX 113,0
150 @%=F%
160 COLOUR 3
170 IF ERR=17 THEN
180 COLOUR 149
190 PRINT TAB(1,29);SPC(28)
200 PRINT TAB(1,31);SPC(28)
210 REPEAT
220 PRINT TAB(1,30)"      ANOTHER GO (Y
/N)?      "
230 A$=GET$
240 UNTIL INSTR("YyNn",A$)
250 IF INSTR("Yy",A$) THEN RUN
260 ELSE
270 PRINT TAB(0,30)REPORT$;" AT LINE "
;ERL
280 ENDIF
290 COLOUR 128
300 PRINT TAB(0,31);
310 ON
320 END
330 :
340 DEF PROCInitialise
350 LOCAL IB%,OB%
360 F%=@%
370 @%=&808
380 IF N%<2 OR N%>255 THEN N%=250
390 IF Q%<1 OR Q%>255 THEN Q%=75
400 IF S%<1 OR S%>2 THEN S%=1
410 n=N%
420 g=Q%
430 k1=2
440 k2=3
450 PROCInquire(n,g)
460 IF S%=2 THEN
470 xytop=960
480 ygap=80+320
490 ELSE
500 xytop=964
510 ygap=79
520 ENDIF
530 DIM IB% 20
540 DIM OB% 20
550 !IB%=148
560 IB%!4=150
570 IB%!8=-1
580 SYS "OS_ReadVduVariables",IB%,OB%
590 PROCcheckscreenSize(OB%!4)
600 screen1=!OB%
610 screen2=screen1+&14000
620 offset=&14000-(320*4)
630 G%=screen1+offset
640 H%=screen2+offset
650 VDU21
660 DIM hodgepodge 2000
670 FOR pass=0 TO 3 STEP 3
680 PROCAssemble(pass,hodgepodge,n,g)
690 NEXT pass
700 VDU6
710 MODE 13
720 OFF
730 *FX 112,2
740 CLG
750 PROCshowparams
760 *FX 112,1
770 CLG
780 PROCshowparams
790 PROCsetuphodgepodge(n)
800 ENDPROC
810 :

```

```

820 DEF PROCprocess
830 TX=1
840 COLOUR 11
850 COLOUR 128+21
860 REPEAT
870 CALL hodgepodge
880 WAIT
890 IF G%<H% THEN
900 *FX 113,2
910 *FX 112,2
920 ELSE
930 *FX 113,1
940 *FX 112,1
950 ENDIF
960 PRINT TAB(31,1)TX
970 TX+=1
980 SWAP G%,H%
990 UNTIL FALSE
1000 ENDPROC
1010 :
1020 DEF PROCInquire(RETURN n,RETURN g)
1030 MODE 13
1040 COLOUR 23
1050 PRINT TAB(2,2)"HODGEPODGE CELLULAR
AUTOMATA"
1060 COLOUR 56
1070 PRINT TAB(4,6)"Cell size = ";S%
1080 PRINT TAB(5,8)"k1 = ";k1
1090 PRINT TAB(5,9)"k2 = ";k2
1100 PRINT TAB(5,10)" n = ";n
1110 PRINT TAB(5,11)" g = ";g
1120 COLOUR 43
1130 INPUT TAB(5,15)"new n (2-255) : "A
$
1140 TX=VAL(A$)
1150 IF TX>1 AND TX<256 THEN n=TX
1160 PRINT TAB(21,15);n;"      "
1170 INPUT TAB(5,17)"new g (1-255) : "A
$
1180 TX=VAL(A$)
1190 IF TX>0 AND TX<256 THEN g=TX
1200 PRINT TAB(21,17);g;"      "
1210 INPUT TAB(5,19)"new size (1-2) : "A
$
1220 TX=VAL(A$)
1230 IF TX>0 AND TX<3 THEN S%=TX
1240 PRINT TAB(21,19);S%;"      "
1250 N%=n
1260 Q%=g
1270 OFF
1280 ENDPROC
1290 :
1300 DEF PROCcheckscreenSize(size%)
1310 IF size%>=&28000 THEN ENDPROC
1320 CLS
1330 COLOUR 99
1340 PRINT '
1350 PRINT "*****"
*****"
1360 PRINT "This program requires 160K
of screen RAM"
1370 PRINT "*****"
*****"
1380 PRINT '
1390 PRINT " -- RECONFIGURE SCREENSIZE
to 20"
1400 PRINT
1410 PRINT "ie *CONFIGURE SCREENSIZE 2
0"
1420 PRINT
1430 PRINT " -- then press <CTR-BREAK>"
1440 PRINT "*****"
1450 END

```

Continued ▶



# YELLOW PAGES

## G R A P H I C S

### ◀ Hodgepodge continued

```

1460 :
1470 DEF PROCshowparams
1480 COLOUR 8
1490 COLOUR 128
1500 PRINT TAB(31,4)"k1 = ";k1
1510 PRINT TAB(31,5)"k2 = ";k2
1520 PRINT TAB(31,6)" n = ";n
1530 PRINT TAB(31,7)" g = ";g
1540 ENDPROC
1550 :
1560 DEF PROCsetuphodgepodge(n)
1570 LOCAL x,y,o,R,LX
1580 R=n+1
1590 o=G%
1600 IF S%=2 LX=TRUE ELSE LX=FALSE
1610 FOR x=xytop TO 4*S% STEP-4*S%
1620 o-=ygap
1630 FOR y=xytop TO 4*S% STEP-4*S%
1640 o-=S%
1650 ?o=RND(R)-1
1660 IF LX THEN o?1=?o:o?320=?o:o?321=?
o
1670 NEXT
1680 NEXT
1690 ENDPROC
1700 :
1710 DEF PROCassemble(pass,org,n,g)
1720 LOCAL S,A,t,x,y,old,new,B,basic
1730 LOCAL sp,link,pc
1740 temp=0:result=0
1750 S=1:dividend=S
1760 A=2:divisor=A
1770 t=3
1780 x=4
1790 y=5
1800 old=6
1810 new=7
1820 B=8
1830 d3=9
1840 d5=10
1850 d6=11
1860 d7=12
1870 sp=13
1880 basic=14:d9=14
1890 pc=15
1900 P%=org
1910 [
1920 OPT pass
1930 STMFD (sp)!,{basic}
1940 ADR r0,data
1950 LDR d3,[r0]
1960 LDR d5,[r0,#4]
1970 LDR d6,[r0,#8]
1980 LDR d7,[r0,#12]
1990 LDR d9,[r0,#16]
2000 MOV x,#xytop
2010 .forx
2020 SUB old,old,#ygap
2030 SUB new,new,#ygap
2040 MOV y,#xytop
2050 .fory
2060 SUB new,new,#S%
2070 SUB old,old,#S%
2080 LDRB t,[old]
2090 CMP t,#n
2100 MOVEQ t,#0
2110 BEQ plot
2120 MOV A,#0
2130 MOV B,#0
2140 MOV S,#0
2150 MOV temp,t
2160 FNcheckcell
2170 LDRB temp,[old,#-(321*S%)]
2180 FNcheckcell
2190 LDRB temp,[old,#-(320*S%)]
2200 FNcheckcell
2210 LDRB temp,[old,#-(319*S%)]
2220 FNcheckcell
2230 LDRB temp,[old,#-S%]
2240 FNcheckcell
2250 LDRB temp,[old,#(321*S%)]
2260 FNcheckcell
2270 LDRB temp,[old,#(320*S%)]
2280 FNcheckcell
2290 LDRB temp,[old,#(319*S%)]
2300 FNcheckcell
2310 LDRB temp,[old,#S%]
2320 FNcheckcell
2330 CMP t,#0
2340 ADRNE temp,divtable
2350 ADDNE pc,temp,divisor,ASL#4
2360 CMP B,#6
2370 MOVGE t,#1
2380 CMP B,#3
2390 ADDGE t,t,#1
2400 ADD t,t,A,ASR#1
2410 .return
2420 CMP t,#n
2430 MOVGT t,#n
2440 .plot
2450 FNplotpoint(t,new)
2460 .nexty
2470 SUBS y,y,#(4*S%)
2480 BNE fory
2490 .nextx
2500 SUBS x,x,#(4*S%)
2510 BNE forx
2520 LDMFD (sp)!,{pc}
2530 .divtable
2540 MOV result,#&10000
2550 ADD t,result,#g
2560 B return
2570 FNOP
2580 MOV result,dividend
2590 ADD t,result,#g
2600 B return
2610 FNOP
2620 MOV result,dividend,ASR#1
2630 ADD t,result,#g
2640 B return
2650 FNOP
2660 MUL result,dividend,d3
2670 MOV result,result,ASR#16
2680 ADD t,result,#g
2690 B return
2700 MOV result,dividend,ASR#2
2710 ADD t,result,#g
2720 B return
2730 FNOP
2740 MUL result,dividend,d5
2750 MOV result,result,ASR#16
2760 ADD t,result,#g
2770 B return
2780 MUL result,dividend,d6
2790 MOV result,result,ASR#16
2800 ADD t,result,#g
2810 B return
2820 MUL result,dividend,d7
2830 MOV result,result,ASR#16
2840 ADD t,result,#g
2850 B return
2860 MOV result,dividend,ASR#3
2870 ADD t,result,#g
2880 B return
2890 FNOP
2900 MUL result,dividend,d9

```

Continued ▶



# YELLOW PAGES

## G R A P H I C S

### ◀ Hodgepodge continued

```

2910 MOV result,result,ASR#16
2920 ADD t,result,#g
2930 B return
2940 .data
2950 EQU D (2^16)/3+1
2960 EQU D (2^16)/5+1
2970 EQU D (2^16)/6+1
2980 EQU D (2^16)/7+1
2990 EQU D (2^16)/9+1
3000 ]
3010 ENDPROC
3020 :
3030 DEF FNcheckcell
3040 [
3050 OPT pass
3060 CMP temp,#n
3070 ADDEQ B,B,#1
3080 CMPNE temp,#0
3090 ADDNE A,A,#1
3100 ADD S,S,temp
3110 ]
3120 =""

3130 :
3140 DEF FNplotpoint(colour,addr)
3150 [
3160 OPT pass
3170 STRB colour,[addr]
3180 ]
3190 IF S%=2 THEN
3200 [
3210 OPT pass
3220 STRB colour,[addr,#1]
3230 STRB colour,[addr,#320]
3240 STRB colour,[addr,#321]
3250 ]
3260 ENDEF
3270 =""
3280 :
3290 DEF FNOP
3300 [
3310 OPT pass
3320 MOVNV r0,r0
3330 ]
3340 =""

```

### See Spyro Mania, page 87

```

10 REM >Rose
20 REM Version 1.01 : 12 Jan 1989
30 REM by Steve MacGuire
40 REM for B/B+/M/C/E/A
50 REM (c) BBC Acorn User 1989
60 :
70 MODE 0
80 PROCinit
90 REPEAT
100 ON ERROR VDU 12,26:END
110 PROCinput
120 ON ERROR RUN
130 PROCrose
140 UNTIL FALSE
150 END
160 :
170 DEF PROCrose
180 A%=0
190 CLG
200 REPEAT
210 A%=(A% + D%) MOD 360
220 R=S%*SIN RAD((N%*A%) MOD 360)
230 T=RAD(A%)
240 DRAW R*SIN T,R*COS T
250 UNTIL A%=0
260 IF F% THEN A%=INKEY 100
270 ENDPROC
280 :
290 DEF PROCinit
300 VDU 19,0,4,0;
310 VDU 24,256,0,1279,1023;
320 VDU 29,768,512;
330 VDU 25,4,0,0;
340 VDU 28,0,31,15,0
350 PRINT "THE ROSE"
360 S%=500
370 F%=FALSE
380 ENDPROC

390 :
400 DEF PROCinput
410 IF F% THEN PROCrandom ELSE PROCcho
ose
420 ENDPROC
430 :
440 DEF PROCrandom
450 N%=RND(359)
460 D%=RND(359)
470 PRINT "N = ";N%
480 PRINT "D = ";D%
490 ENDPROC
500 :
510 DEF PROCchoose
520 PRINT "Enter values"?"for N and D
"
530 PRINT "1-359 for rose"?"Return f
or demo"
540 INPUT "N = "N%
550 G%=(N%>0) AND (N%<360)
560 IF G% THEN INPUT "D = "D%
570 G%=G% AND (D%>0) AND (D%<360)
580 F%=(N%=0) OR (D%=0)
590 IF NOT G% THEN PROCrandom
600 ENDPROC
610 :
620 DEF PROC@
630 T%=PAGE+?(PAGE+3)+6
640 T%="Version "+LEFT$(STR$(VAL(MID$(
$T%,9,4))+0.01),4)+" : "
650 IF INKEY-256=253 THEN T%=T%+MID$(T
IME$,5,11) ELSE T%=T%+RIGHT$(T%,11)
660 IF LEN(T%)=LEN($T%) THEN $T%=T%
670 T%=$(PAGE+6)
680 T%=INSTR(T%,">")+1
690 T%=MID$(T%,T%)
700 OSCLI("SAVE "+T%+" "+STR$~PAGE+" "
+STR$~TOP+" FFFF802B FFFF0E00")
710 ENDPROC

```



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| <input type="checkbox"/> DECEMBER  | 0505-3 |

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# OFFERS

## THIS MONTH'S LISTINGS

The 5.25-inch and 3.5-inch discs for March have a mix of programs that are sure to interest all our readers. There's David Harper's program to make sideways RAM programming simple, with his utility for *Wordwise Plus* users.

Remember Spirograph? Now *BBC Acorn User* has produced the computer version; make your own original patterns or just admire the demonstration.

Hints and Tips includes a Basic program



which allows you to reflect any part of the screen, plus there's Cut and Paste, a super sideways ROM image you will be happy to add to your collection. And there's a revamped version of August '88's screen printing program.

For the Archimedes only, but included on both discs, there is the Hodgepodge machine. Plus in *Agora* there is an easy way to back up hard discs — saving floppy discs by compressing the data.

## *There's a Hodgepodge of programs on March's disc*

### GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord*, *Wizalon*, *Castle of Nightmares*, *Run Silent*, *Run Deep*, *Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent *Abusers*. Test your knowledge with *Mastermind* and start

playing *Varpon* and *Lurch* to win.

Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it will make the perfect gift.

## *Games galore for just £8.95*

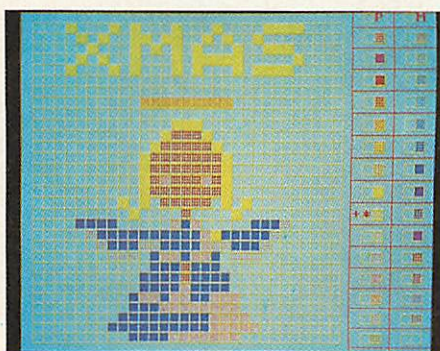


### '87 COMPILATION DISC

*Acorn User* has put all your favourite programs, routines and utilities from 1987 on one disc.

Featured are: *Kiddie Art*; *Tapestry*; *PCB by CAD*; *Autumn and Theme*, our music programs from April '87. Also featuring on the disc is Joe Telford's GEM-like front end for the Master including a desktop calendar and year planner.

Other useful utilities include a proportional screen dump, a *View printer*



driver generator, a monitor-testing routine and a routine for printing spreadsheets sideways.

The second half of the disc is devoted to graphics, with a video image enhancer and six of the best Graphics Bonuses.

The *Acorn User '87 Compilation* disc comes in 5.25-inch 80-track format, with a comprehensive manual which includes all function key strips and instructions needed for the programs.

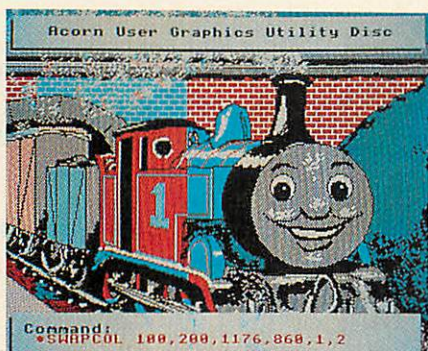
## *All the very best of '87 on one disc*

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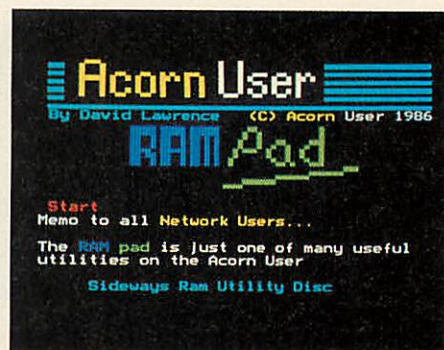
# OFFERS

## SOFTWARE & GRAPHICS



### Great graphics utilities

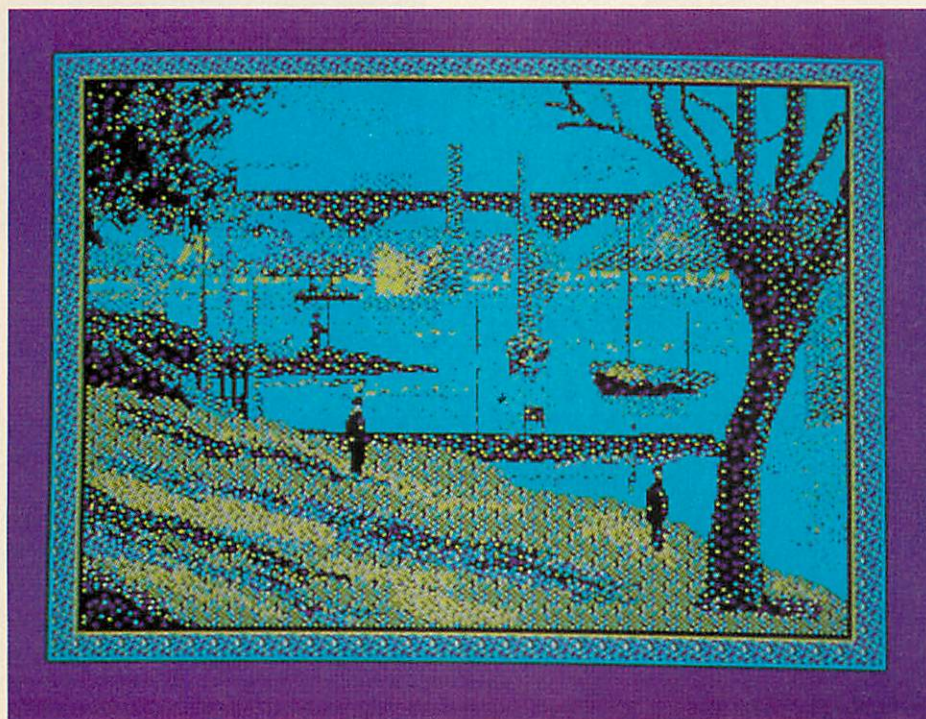
The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 stand-alone machine code utilities, an advanced teletext editor, several useful Basic procedures, an easy-to-adapt disc header and index. Included are: \*ROTATE, rotates area through 180 degrees; \*SWAPCOL, swaps two colours; \*COLFILL, a colour-fill routine; \*SVPIC, saves a compacted picture; \*LDPIC, reloads a compacted picture. There are many utilities to manipulate graphics.



### Sideways RAM made simple

The *Acorn User* sideways RAM disc gives you many more utilities for your sideways RAM. These include: RAMpad – your computer's answer to the pad and pen; six different on-screen fonts available in all modes; a 15k printer buffer; Screen Swap – store and recall mode 4 or 5 screens; \*ROMHEAD – standard service ROM header; \*RLOOK – allows you to examine sideways RAM or ROM.

There are many more utilities on this 40/80-track 5.25-inch disc and it's a snip at £9.95.



### Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *BBC Acorn User*.

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers*, a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, *Willow* (Nov '86) and *Magician* (Jan '86), as well as several pictures commissioned by *The Times*.

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside*, Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

You can create your own *pièce de résistance* using the Pixel Editor and Super Painter programs. Pixel Editor allows you to draw in and alter minute detail, while Super Painter enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

*Portfolio* comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

TO ORDER USE THE FORM ON PAGE 114

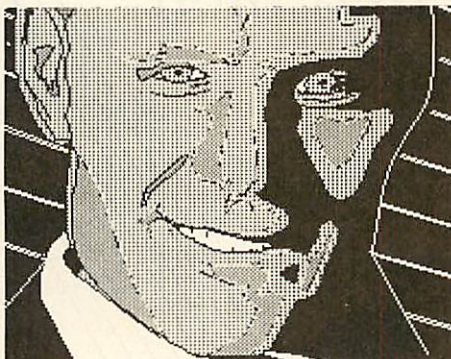


# OFFERS

## USERDUMP ROM

**BBC/B/  
B-/M/  
C** The *UserDump* ROM will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing it directly from the keyboard. A perfect dump can also be obtained while a machine code program is running.

*UserDump* can dump a graphics window, make a distortion-free dump of mode 0 screens using plotter graphics,



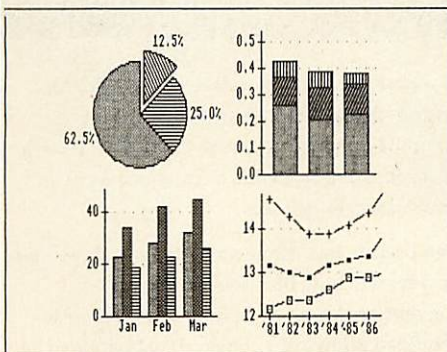
translate a teletext screen into mode 1, and shift any area of memory.

*UserDump* will work with any Epson-compatible printer which has single-density and double-density bit-image graphics including the Star Gemini, Delta, SG, SD and SR, Canon and Kaga NLQ.

Details of further commands and printer compatibility are available from Seran at Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.

## Trouble-free screen dumps for £19.95 with UserDump

## VIEWCHART DISC



**BBC/B/  
B-/M/  
C** *ViewChart* features a suite of programs which can be used to produce high-resolution graphics in pie chart, bar chart or line graph form. Data can be entered manually, or read from *ViewSheet*, *ViewStore* or *View* files.

## Present figures with ViewChart

The charts can be labelled and shaded to give a really professional appearance.

Epson-compatible screen dumps are included, one of which will produce a print-out to the full width of an A4 sheet. Screen dumps for other printers can be painlessly installed.

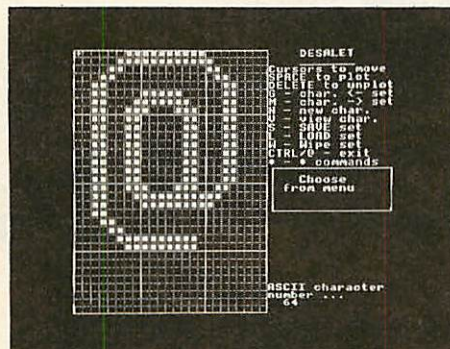
The software is provided on a 5.25-inch 40-track disc (with 80-track converter). And the price of this professional package? Just £12.95.

## CALLIGRAPHY DISC

**BBC/B/  
B-/M/  
C/E** Now you can produce anything from professional tickets to letterheads and posters with the *Calligraphy* disc.

*Desalet* is a font creator which produces customised letters to your personal design and saves you using repetitive data statements and error-prone calculations. All font sets can be up to 94 characters long.

*Modical* allows the use of disc-based



font sets created with *Desalet*. *Modical* incorporates a modified file creation program, which allows files to be printed out immediately or saved for later.

An enhanced font ROM, in the form of a sideways RAM image, allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true Wysiwyg.

This superb disc comes on 40/80-track 5.25-inch disc and is only £9.95.

## Design your own fonts with Calligraphy

ORDER WITH THE FORM ON PAGE 114



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With the ever increasing popularity of FAX machines this form of document communication is set to replace conventional postal deliveries with a fast, reliable, strike free, electronic mail service.

FAX PACK brings this world of facsimile document transfer to the Archimedes. By combining the facilities of a FAX machine with the power and flexibility of a computer, FAX PACK offers considerable benefits over conventional FAX systems.

FAX PACK basically allows any document, be it printed text or graphics, or an electronic document such as a word processor file, to be sent to FAX machines anywhere in the world, in seconds. This is done by scanning (digitising) the document and then sending it digitally over a normal phone line to the receiving FAX machine which re-constructs the image and then prints it.

#### THE HARDWARE

The basic FAX PACK consists of a modem podule that plugs into any Archimedes computer, and the software to drive it. A variety of options are available such as scanners and power switching boxes.

The podule has connections for a scanner and power switching box (see below) and a conventional telephone line. An adapter is provided allowing a conventional phone to be paralleled with FAX PACK so that only one telephone line is required for both FAX and conventional use. However if a lot of FAX mail is going to be sent/received then a separate dedicated line is advisable.



Scanner & Sheet Feeder



Unlike many normal FAX machines the hardware also provides both auto-answer and auto-dial facilities making it convenient and allowing completely automatic operation without human intervention.

### THE SOFTWARE

As part of FAX PACK this not only provides all the basic mechanisms for communicating with FAX machines but also includes high level WIMP based facilities for viewing FAXes on screen within a window, where they can be pixel edited, scaled, cropped, printed, etc.

This WIMP based software is simplicity itself to use so FAX PACK can be used in the office by staff with little or no computer experience. Of course unlike any conventional FAX machine FAXes can be viewed on screen, or filed away on disc for future reference without ever getting onto paper.

The software also allows text, word processed files, even graphics, to be automatically converted to a suitable FAX format for sending to other FAX machines. The paperless office becomes closer to reality since it is now possible to write articles, documents or letters and then send these directly to remote machines without involving paper.

However facilities are also included for printing FAXes to a range of 9 and 24 pin dot matrix, inkjet and laser printers.

### SUPER FAST MODEM

The FAX podule actually consists of a 9600 bps auto-answer, auto-dial modem, and so can be used for much more than just FAX transfer. The software can detect the type of remote machine, and if it finds a similarly equipped computer (rather than a FAX machine) at the other end it can then transfer ANY file fully error checked and glitch free. And by using some very advanced transmission protocols it can transmit data 4 times faster than most conventional modems on normal telephone lines.

### THE SCANNER

In order to send printed material it is necessary to digitise the page. An optional hand-held, A4 width, 200 dpi scanner can connect to the FAX podule. Being hand-held it is not only supremely compact, but it can digitise complete A4 pages, or pages from books or other awkward shaped documents.



Of course images scanned in this fashion are not only useful for FAX purposes but also for inclusion in word processor or desk top publishing programs. FAX PACK software allows company logos and signatures to be scanned, cropped and then included as part of other FAXed material.

### AUTOMATIC POWER SWITCH

This external power switching box can automatically switch the computer on in order to answer incoming FAXes. The FAX podule can then answer the phone, receive the FAX and file it to disc, and then switch the computer off again. The computer can therefore be switched off and left completely unattended for very long periods of time.

### GUARANTEE

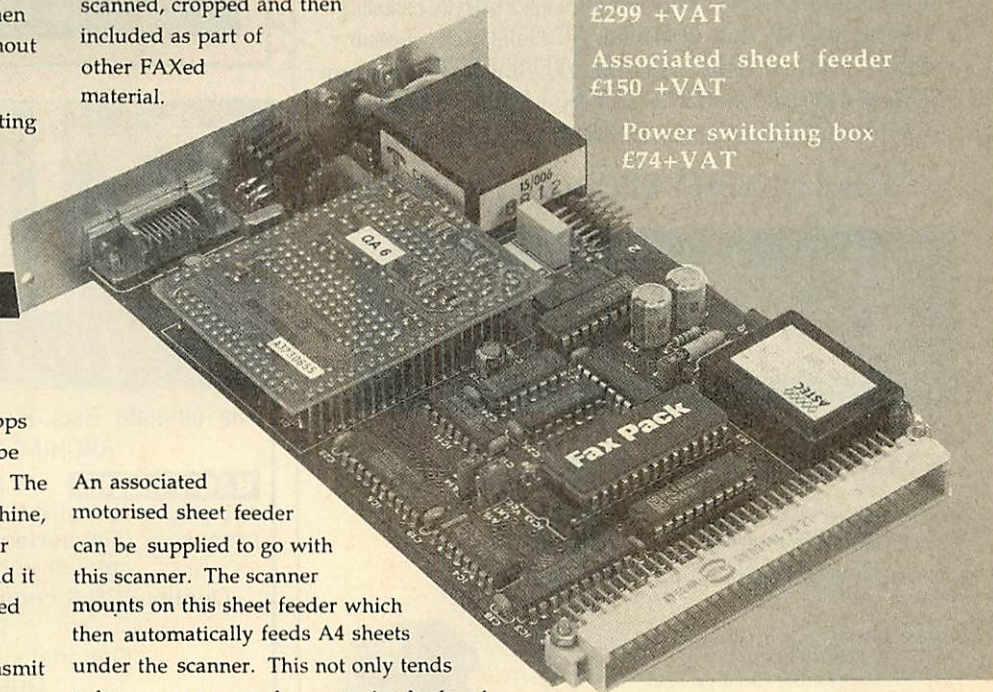
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£150 +VAT

Power switching box  
£74+VAT



An associated motorised sheet feeder can be supplied to go with this scanner. The scanner mounts on this sheet feeder which then automatically feeds A4 sheets under the scanner. This not only tends to be more accurate than scanning by hand, but is also more convenient.



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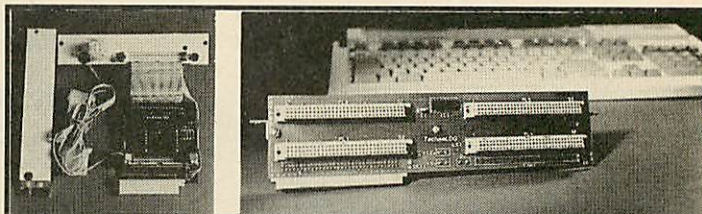


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## THE GAMES PAGE

### A FISHY TALE

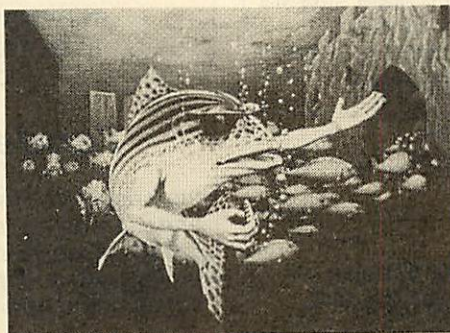
**Sam Greenhill looks at what's new, and finds Minerva is hoping to sound out a new Arc game**

I expect we will soon walk into shops and see some Easter eggs alongside the games. With any luck, one of them ought to be Audiogenic's BBC compilation – finally finished and expected in the shops for February. Just like the first two *Play It Again Sam* compilations, *Fab Four* boasts four strong titles. Three are sequels to *Thunderstruck*, *Pyscastris*, and the *Sphere of Destiny* respectively. The fourth is *The Omega Orb*, so *Fab Four* sounds like a good deal to me.

Arc owners with Gem Electronics' *Word Up Word Down* scrabble-type game may want to know of a hidden game 'within' the main one. Pull down the Options menu and select the smiley face. Next, go down to the bottom of the screen where the credits are given and click on the 'o' of the word 'now' with Cancel. Our thanks for this 'feature' to Keith McAlpine of Gem Electronics.

The newest addition to the games market, Impact Software, is to release its latest this month. Called *Orbital*, it is vaguely similar to *Marble Madness* in that you are a marble. The difference is that you also collect marbles and are pursued by octopuses. The game is spread over 12 levels and when you've completed them, you do them again without the marbles appearing on the map. Thus, the idea is to remember where the marbles were first time round!

One of the main features of Impact Software is its low prices, and so far all its games have been under £5, (not £10 as mentioned in January's *BBC Acorn User*). Impact's Steve Botterill, formerly of Superior, is appealing to budding new software writers out there, who have written any games. He explained that when he was at Superior, he was sent some games that weren't suitable for the £11.95 range but would be perfect for



**Look out for Fish! Rainbird's wacky adventure for the Arc. You can buy the game later this month – watch these pages for a review**

the 'under a fiver' policy of Impact. So if you've written a game and would like it published write to Steve Botterill at Impact Software, Neepsend House, 1 Percy Street, Sheffield S3 8AU.

Grandslam, publisher of the excellent Archimedes games *Terramex* and *Pacmania* (reviewed this month) is unfortunately rather sceptical about the future in Arc games. *Pacland* is its next release but so far it's only planned for the ST and Amiga. It is basically a question of whether the Archimedes version can be squeezed into the schedule. *Hunt for Red October* (*Conqueror* underwater) was one game that was intended to go through the Arc conversion process, but whether we will see it or not is now down to luck and little else.

Robico of *The Hunt* and *Enthar Seven* fame, has a full agenda for adventure games. I think it's the first software house to produce a game with versions for computers right across the Acorn spectrum, excepting early machines such as the Atom. *Blood of the Mutineers* is a text-only pirate adventure for the BBC and Electron, which will also provide graphics for Arc owners. After that, sometime in the late spring, is *The Fugitive* which will probably come in the

same format although the name will be changed due to copyright laws.

Minerva has almost finished another Archimedes game, this time called *ThunderMonk*. You are a ghostly monk floating over an old castle collecting objects of one sort or another. Minerva describes it as a cross between *Hoverbod* and *Repton*. Instead of firing bullets your monk casts spells. This has the supernatural advantage of being able to shoot through walls and objects! Some walls are invisible so your monk must 'grope' around while avoiding the cacti that inhabit the castle. The authors concerned with the sound in *ThunderMonk* are aiming for samples that will allow Minerva to run a 'spot the sound' competition. This would involve recognising digitised sounds that are used in the game. It was actually attempted with Minerva's *Planetoid* clone *Orion*, but some of the noises were considered too vague to be recognised and so the competition was cancelled.

However, for *ThunderMonk* the samples are being selected carefully, so watch out for this in February.

Nova Fisher of Minerva has pointed out its policy on Archimedes games. She explained that Minerva isn't a games company and it never really intended to write any in the first place. However, when people buy the Archimedes, they often want to have a few games for their kids (that's their story) so Minerva has been trying to fill the market with a few classics for business people to purchase with their machine.

Please let me know if you have any cheats or have any special methods of winning a game. Also, high scores and any suggestions should be sent to The Games Page, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.



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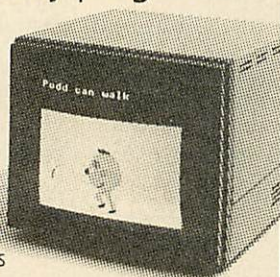
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# REVIEWS

## GAMES

### THE SPORTING LIFE



**A Question of Sport**; Superior Software, BBC cassette £12.95, BBC disc 5.25-inch £14.95, BBC disc 3.5-inch £19.95, Electron cassette £12.95.

BBC Television's *A Question of Sport* is hosted by David Coleman and involves two teams of sporting 'personalities'. The BBC micro version of the TV quiz is a ragged simulation, and during the six rounds it features all the famous events used in the real life game.

The game is text based, but there are 12 small portraits of possible team players, and one of your first tasks is to select two of them for your side. Then the computer or your opponent does the same, and after a couple of minor questions concerning your most knowledgeable sport, the game begins. David Coleman introduces it just like on TV, only with a scrolling speech bubble. The first round is entitled 'The Pictureboard', and selection of a square reveals an icon to represent a certain sport, and this determines the subject on which the subsequent question is asked.

The questions themselves are all multiple choice and 'spoken' by David in more scrolling speech bubbles. When he's said his bit you have about six seconds to answer – it takes almost this long to read the choices so it's a case of you either know it or you don't. The latter was most common for me, so after an unsuccessful guess the question is passed over to the other team. One thing I didn't like: correct answers aren't given when both teams fail.

I'm not the world's greatest sports genius, but I was surprised to find I doubled the computer's score in my first game. This suggested to me that it wasn't too good either. If you do buy the

game, you will probably get more amusement out of it if you play against a friend. The game isn't very exciting, but it can be good fun if you know some answers. *A Question of Sport* should attract the sports fans.

Sam Greenhill

### £10 LIZARDS ALIVE

**Archimedes Repton 3**; Superior Software, 3.5-inch disc, £19.95.

The 'Repton' character needs no introduction to Beeb games players. Now our hero has wandered onto the Archimedes and I put him through his paces.

On loading the game, you are presented with the main options just as in the BBC version. For those who have not played any of the Repton games the object is to collect diamonds from a maze. Not as easy as it sounds, as rocks, spirits and monsters are all out to take revenge.

It's disappointing that there's no difference in either gameplay or sprites between the BBC and Arc version. Although it uses one of the Arc's high resolution modes, it plays as if in mode 2 on the BBC!

Along with the original *Repton 3* screens, sets of screens for *Around the World*, *The Life of Repton*, *Repton Thru Time* and the usual screen and character editor are included. That's a total of 144 different screens with some very complex puzzles. The only additions are four tunes – and a number of bugs.

I also found the screen and character editor very unpredictable. It has a useful feature where you can test out your own screens without having to save to disc first. However, I have on occasion 'lost' all my screens and characters for no apparent reason. The transporters which take you to a different area of screen were also very hard to make use of.

Extra features included are a save position, more colours and higher resolution. If the prices of the game and the extra screens were added up on a Beeb, the price would come to £33.80. So £20 for this set and the extra features make it good value despite the annoying bugs.

Ian Boulton

### £10 SMILING SNAPPERS



**Archimedes Pacmania**; Grandslam, 3.5-inch disc, £19.95.

Updates of bewhiskered classics seem to be the main fare on offer to Arc gamers since companies started releasing games at all for the machine. So after *Orion* and *Fireball*, homages to the glories that were *Defender* and *Breakout*, I didn't have great hopes of *Pacmania* – an updated *Snapper*. But I was wrong!

When I loaded up the disc I was instantly hooked by the cutesy tableaux which introduce each level. But *Pacmania* doesn't just add a few fancy screens and sprites to the original; it adds a whole new dimension.

A sloping, fenced maze viewed from the side, ghosts you can jump over rather than just run away from, and best of all a jolly, bouncing Smiley Pacman. If only the soundtrack were acid house ... it's actually very acceptable disco stuff.

Pacman gulps very satisfyingly when eating any of the strawberries or stranger things which pop up. The rest of the time I can't work out whether he's mumbling 'Whip me' or 'Whitney', though I'm sure it's not important.

The game is faithful to its arcade origins. After three goes you must install more credits. A high score immortality can be achieved at the expense of lots of tedium with the up/down keys, and the demo screen says 'Game Over'.

My only complaint is that it's too easy; after only a few games I'd seen all four levels in their various coloured guises. Eventually you see them again and again in different colours and with more devious ghosts. And more levels would have been better, though that will probably be rectified by a *Pacmania II*.

Carol Attack



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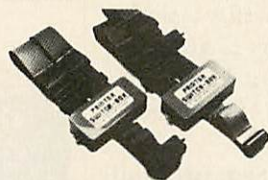


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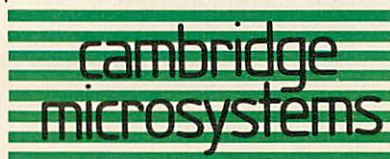
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# REVIEWS

## SOFTWARE

# LIVING BY NUMBERS

**There are few packages that schools can't afford not to have. Martin Phillips tells of two he believes fit this category**

What makes a good piece of educational software? First it must do something useful, something that cannot be done as effectively without using a computer. The best programs are usually 'content free' – that is, they enable something to happen, but that something is not already built into the program by the programmer. The software needs to work with a wide age range – even though it's intended for a single year group. As the Cockcroft Report pointed out, at the chronological age of eleven, there is a seven year spread of abilities. Finally the program needs to be easy to use, and have good supporting documentation and even other resource media. And if it is doing something very new, it needs to come with a good range of worked examples to show teachers its potential.

Real-life simulations and database software often find favour, but because it appears abstract, mathematics teaching isn't supported by as wide a range of software as some subjects.

*Numerator*, a new maths package from Logotron, offers an exciting way to tackle anything from simple mystery machines (teachers may remember *Jane* produced by the ITMA group) and number patterns, to investigations into probability and trigonometry. *Numerator* aims to make numbers interesting for children and easy for them to think about, discuss, and experiment with. In the process, they gain a better feel for and understanding of mathematics.

The package is supplied in a very flimsy cardboard box which will not last long in a school environment. Inside is a well produced spiral-bound manual, somewhere in size between A4 and A5, and nearly two hundred pages with a very full index. Three discs are tucked inside the manual, a most unsatisfactory arrangement. The discs are labelled the 'system' disc, a 'modules' disc and a 'walkthrough' disc. They'll work on a BBC model B, a Master or a Master

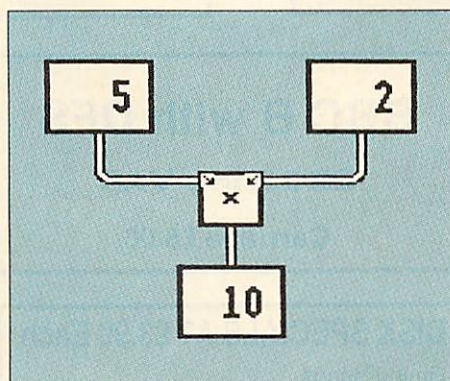


Figure 1. Numerator: easily built processors

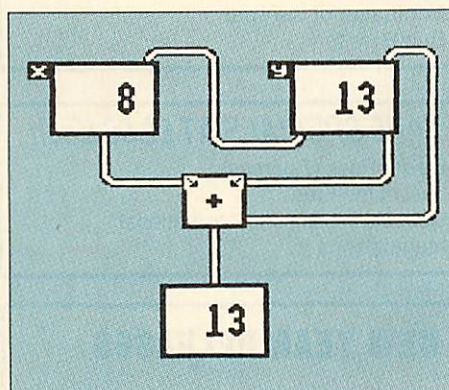


Figure 2. Graph of values can be examined

Compact, and versions for the Archimedes and the Nimbus will be available soon.

A review can't give a complete picture of *Numerator*, but the principles behind its use are quite simple. There are three sorts of boxes that can be drawn on the screen. The first is a number tank. This tank is used to input and display numbers. The next box type is a processor box: the basic operations carried out in processors can be either add, subtract, multiply, divide or stop. To link these tanks and processors, there are 'pipes'. A number tank can have one input pipe from elsewhere, or be fed with a number from the keyboard. Processor boxes have two inputs, and any number of outputs can pipe the result elsewhere. The number tanks, processors and pipes are placed on the screen by selecting

them as cursors using the function keys. The cursors can be moved around the screen using the arrow keys, and they are fixed by pressing the Return key. Linking each element up with the pipes by this method is very simple: a processor which will multiply a number by two would look like the arrangement in figure 1. If you wish, text can be added to make the machine you build easier to understand.

The simple processor in figure 1 was constructed in about a minute, and that was after playing with *Numerator* for only half an hour. Numbers can be fed into one of the two number tanks at the top, and the result will be displayed in the tank at the bottom.

It is possible to feed the result from one tank back into a previous one. This is a very useful feature and is used frequently in more complex 'maths machines'. Consider the Fibonacci sequence, where each number is generated by adding the previous two numbers together with the starting numbers being given as 0 and 1. A system to generate numbers in the Fibonacci series is shown in figure 2. The 'x' and 'y' labels have been inserted so that a graph of the two values can be examined. Numbers are entered into the top of each tank and fed out at the bottom. At each cycle of the system numbers are fed into each tank from the bottom of either the other tank or the add module. At the same time the existing numbers in each tank are added together, stored in the add module and displayed in the output tank.

As well as the five basic processors, an extended set can be enabled from one of the options menus. The extensions contain greater than, less than, equal (a number is only output when both the input numbers are the same), DIV, MOD, power, AND, OR and Exclusive-OR boxes. The last three processors perform bitwise comparisons between the two inputs like AND, OR and EOR in Basic. There is also a rather weird



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# REVIEWS

## SOFTWARE

function called a 'junction', which outputs the left side input if there is one, or the right input if there's no lefthand number. The use for this junction process is illustrated in the standard deviation machine (see figure 3). For a complex machine like this, you could run out of room on screen, but you can scroll the screen left, right, up and down to allow your construction to grow.

The final type of box is a module. A module is a previously-assembled machine that has been saved to disc (the black box approach). Thus it is possible to devise a series of mathematical building bricks, each carrying out a separate process, which can then be linked to form a more complex machine. Up to six modules can be stored in memory at any one time. This facility makes *Numerator* very versatile. The building bricks present tremendous scope for investigative work in mathematics. As well as entering single numbers and waiting to see the result, you could build an increment module which you make count from any starting point to any stop point with a given step rate. Add this to any new machine and it can sequence automatically. The speed can be set to fast or slow or single step. Slow rate is one process per second – you could even use this fact to build a clock!

*Numerator* also has graphing and printing facilities. Both of these are simple to use, and it is possible to graph or print at any time. The print facility will print the whole of the machine you're working on, even though much of the work may be off the screen. It is also possible to chart the results of a process.

Author Peter Hunter ensured that *Numerator* links to some of the BBC micro's other features. It can support a Concept keyboard, or use a mouse as an alternative to the cursor keys. It can take data from the BBC's user and analogue ports and act as a data logger.

The documentation is presented in an unusual way. First there is a long tutorial walkthrough, then a reference section, and finally a series of classroom case studies. It is the walkthrough part which is unusual: this takes you step by step through each facet of the program, and processors used as examples are stored

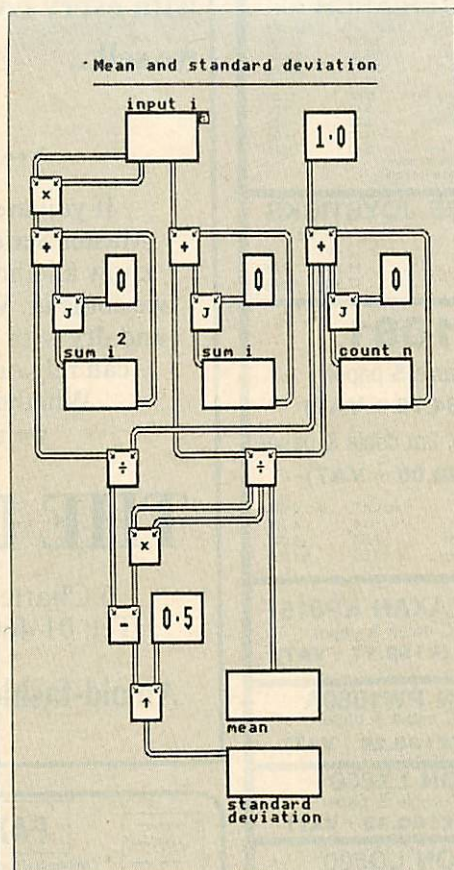


Figure 3. Using the junction process

on the walkthrough disc. It makes an ideal introduction to the program.

There are very few programs that I find really innovative. But *Numerator* is one of these. Eventually, I am sure it will become one of the educational computing 'classics'. Few schools could justify not having a copy! As a program it is not easy to describe: perhaps the best definition is that it does for numbers what a wordprocessor does for text. Logotron calls it a 'mathematical construction kit'. It meets a classroom need that is difficult to do in any other way, and author Peter Hunter deserves commendation for such a superb program.

I can only describe *Numerator* as brilliant. To me this is what educational computing is all about – as an investigative tool for mathematics it is without parallel. It is superbly programmed, and has an excellent handbook together with useful supporting material. My only concerns are the terrible packaging, and the price of about £35, which is rather high for schools, even for a program of this quality.

### Geometrix

*Geometrix* is published by Cambridge Educational Software, and is the first fruit of programming company European Educational Software. It is described as a geometric calculator. Essentially it is able to construct a range of drawings to given dimensions, and then take accurate measurements from these drawings.

Its main use will be with mathematics, but it could be used in any area of the curriculum where problems can be solved by accurate geometrical construction and precise measurements. I could also see the program being valuable for special needs, especially for youngsters whose physical handicap prevents normal access to the curriculum.

*Geometrix* is supplied on a single 80-track, double-sided ADFS disc for the Master 128 only. This is not unreasonable, as I suspect few secondary schools are now without at least one Master. There is a well written A4 loose-leaf handbook together with a set of workcards and an A5 student starter guide. One minor criticism of the documentation is the lack of background detail supplied – for instance the only place where it says the disc is ADFS is on the front cover of the A4 folder. *Geometrix* can be used with either a mouse or the cursor keys and 'quick keys'. The AMX or Watford's excellent mouse worked perfectly. The quick keys are a good idea if you have to rely on the cursor keys.

The thing that always infuriates me is having to leave the drawing area to move across to point at an icon and then return to the drawing area. By using the quick keys, you don't need to move to the icons; it can be accomplished by a single keypress instead.

Essentially the program is operated by using a ruler on the screen. This is a line with a cross at one end and a circle at the other. The ruler can be moved about the screen by pointing to the cross, and altered in shape and orientation by pointing to the circle.

*Geometrix* initially looks hostile and deceptively simple as an educational tool, but it should be of considerable value in some curriculum areas. It has the double merits of being simple to use, logical, and yet very flexible.



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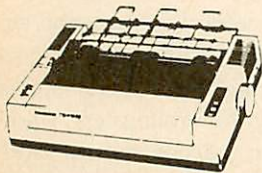
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# REVIEWS

## SOFTWARE

### WET, WET, WET

**Will you put more money into replacing those Victorian sewers, or go for the building of a new sewage works...? Dave Fitcher finds out**

If you become a shareholder in a privatised regional water authority, you'll be interested in how these massive institutions are run and how they perform. The value of your shares and dividends will depend on how well the authority is managed.

*Water Manager* is aimed primarily at the educational market. But Cambridgeshire Software House has produced it for anyone who might be interested in the running of a water authority.

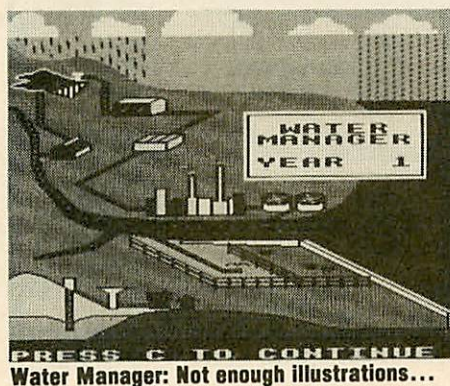
All teachers acknowledge that it is best to give children first hand experience whenever possible. But it can be too dangerous, too expensive, too difficult or too time consuming. Computer simulation may be the answer. Cambridgeshire Software House produced *Water Manager*, especially for environmental and science work, but with application in economics and business studies too.

*Water Manager* is about supplying the water services to a town and village. This includes ensuring that the reservoir is kept as full as possible without depriving the downstream towns of water. Mains have to be repaired and replaced and sewage treatment has to be thought of.

You can't make decisions unless you have information. *Water Manager* provides this in the form of a series of information pages that can be called from the main program menu. These inform you about the water cycle, water resources, supply, sewage and land drainage. Although brief, this gives you basic information which should enable you to get plenty from the program without turning to reference material.

Once you are in charge of the water authority you have a whole series of situation reports at your disposal.

These reports are available while you make the necessary investment decisions that the simulation requires. Four separate reports are available, on resources, water supply, sewers and sewage treatment and land drainage. Each of these reports



DECISIONS Year 1	
Water Resources:	
Thousands of cubic m. per day to be pumped:	20
Water Supply:	
Amount to be spent on repairing mains this year (£1000):	10
Cost of supply (£1000):	2114
Sewers and Sewage Treatment:	
Sewer repair length (m.):	1000
Sewage Works extension (Y/N):	N
Land Drainage:	
Sewer bank repair length (m.):	200
Flood Bank repair length (m.):	2200
Cash available:	
END OF YEAR	
Press any key to continue.	

**...but successful in simulating the real thing**

provide essential information, clearly displayed using a mode 7 screen.

The Resources report tells you how much water is available in the river, how much needs to be left for use downstream, how full the reservoir is, its capacity, and the annual cost of pumping 1000 cubic metres per day into it. The Supply report informs you of the consumption of your area, the amount of water being lost through burst pipes and the cost of pumping a cubic metre of water a day to both the town and the village.

There are six investment decisions to be made each year in *Water Manager*. You have to decide on the amount of water to be pumped each year, the sum of money to be spent on repairing the water mains, and the length of sewers to be repaired. You also have to decide whether to extend the sewage works or not, whether the sea wall needs repair, and the length of flood bank to be repaired. You've got

£6 million to allocate to these jobs. To get the money, you can increase the water rates or borrow extra money from the government.

It's worth remembering that there is a limit to the increase in rates that the public will accept, and that the government may well refuse to loan more cash.

As in real life, running a water authority is not just a question of providing all the customers with their supplies and balancing the books. In *Water Manager* there are various unpredictable elements. For instance, will the weather be so good that there's a drought. When there's a flood, you'll find out whether the river levees are adequate and there are dire warnings about the condition of the sewers.

If your planning and decision making is seriously awry a calamity will be signalled and the game ends. This is well handled, as an explanation of where you went wrong and what the consequences were are given.

There is no doubt that *Water Manager* will enhance your understanding of the role of a water authority. It is actually a joint venture between CSH and Anglia Water, and the contribution from the experts definitely shows.

The software is easy to use and self explanatory. It is supplied with a 15-page A5 booklet which provides lots of very suitable follow-up activities, including some linked science experiments. The package of small posters and pamphlets from the Anglia water authority will save many busy teachers from finding their own material.

Teachers and pupils who used the package over half a term linked with an environmental and scientific study of water found it to be a realistic and extremely comprehensive simulation.

I believe *Water Manager* will be extremely valuable for cross curricular use in secondary education. And I'm sure some shareholders will find it fun too.



# REVIEWS

## SOFTWARE

### ROBOBOD

**Will the automaton be an essential part of the future? Sam and Richard Greenhill look at a package that they believe makes building robots easier**

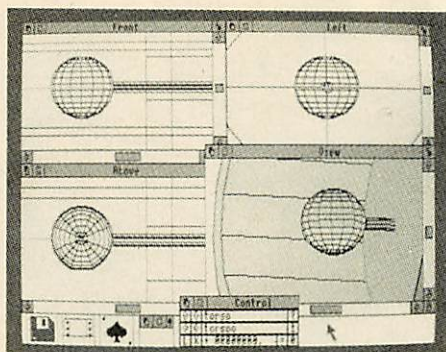
Building a humanoid robot is no easy task – but this is the objective of a group of dedicated eccentrics in North London. There are a dozen or more people involved, and a handful of them meet every Wednesday at a workshop where they work on the machine.

The robot, called Shadow, will ultimately be able to perform most tasks that a human can do. The group still have a long way to go, but one way to stay on target is to model the robot as closely as possible on the one thing we all know works – the human body.

The present concern is the legs – work progresses on a basic frame for the robot while software writers hammer away at keyboards in the background. They are preparing for a proto-type to test their programs, but the hardware team may keep them waiting.

It is difficult to visualise, exactly where muscles should be positioned on the leg and how to shape the leg to house them perfectly. So far, the only way to do this has been trial and error fiddling – but this is tedious and time-consuming. Looking at drawings doesn't help, as they are only two dimensional, and they can't be manipulated unless someone extremely handy with a pencil and rubber is available. What the group needed was a method of displaying the legs in three dimensions, with the power to portray them with as much reality as possible.

Ace Computing is fairly new on the Acorn market, but its first product for the Archimedes looked like a solution to the group's problem. It's a three dimensional drawing package called *Euclid*. It comes in the form of an Arc relocatable module, and like a number of products packaged in this way, it has an example program to demonstrate the commands on offer. In fact it has a number of example programs but the one that does the business is called *ECdesign*. That's the one we put to the test with our robot-designing gang.



**Spheres and cylinders used to create legs**

#### The manual

The first thing to say is that you shouldn't expect to pop in the disc and go. *Euclid* is a complicated package, made no simpler by the manual. The best idea is to collect as many technically minded people as you can, and then sit down together to figure it out.

Before resorting to the guide, we managed to get exactly nowhere, and after consulting the manual we became more confused than ever. The main problem is the omission of a simple tutorial section. There is a part that describes, fairly adequately, how to manipulate an example object supplied on the disc, but it never explains how to start from scratch.

It took us several attempts before we managed to create a single shape. When we had finally done this, we wanted to add some reality. Colour in the index refers to a small paragraph near the beginning of the book: 'Changing values in the control box is usually self explanatory, except perhaps for colour. Colours can be given in any mode! *Euclid* simply does its best to represent the colour you require.' Then it talks about the 16 available shades for red, blue and green. After this it suggests 'Try colouring in the object.' It doesn't say where to enter the variables for red, green and blue, or how, and what figures to use and why. Apparently, when Risc OS is officially released in April, the manual

will be completely rewritten to cater for the new Risc OS version of *Euclid*.

#### ECdesign

*ECdesign* uses the Arc's windows, icons, menus and the mouse. It gives different views of the object currently being edited: an overall view of the scene in 3-D and colour is displayed in a window called *View*, while side and front elevations plus plan views can be selected. There are also nine other 'cameras' available – alternative views, which can be positioned anywhere to observe the scene from any angle. You can also place cameras on the object itself, so when you move it the angle of view isn't altered. The elevation and plan views are wire-frame, and look very professional.

The models created using *Euclid* consist of objects, planes and prisms, which are arranged in a hierarchical tree structure. You can't see the whole structure, just the part you are 'in'. This is shown in a small control box with 12 sections to it. Clicking the mouse on various icons takes you up and down levels, across levels, and sets a host of possible values for scale, rotation, location and colour. And that's just for one axis – x, y and z are all separate.

Like a filing system, \$. is the top of the tree and represents the entire scene. While looking at the current level, it and everything below it in the tree can all be rotated or moved. Four slots in the control box are allocated to directional arrows, and clicking on the left and right ones move through the nodes contained in a horizontal level of the tree, while up and down arrows move between levels. The diagram opposite shows a simple version of Shadow's legs structure.

*Euclid* supports two types of building brick – solids and landscapes. The former uses planes, and for example when building a cube, the user would literally place the square sides on one by one like a cardboard box.



The other way is to create what Ace calls a landscape, which uses 'vanes' to construct a shape. A vane is similar to a plane, but is a 'slice' across the object – lots of slices are used to build a shape. So it is possible to build a simple shape with only two vanes, one defining the top and one the bottom. The surfaces in between are automatically created.

One of the panels in the Control Box (*Euclid* ought to indicate which one!) displays the name of the object, vane, plane or point you are currently working on. At the same time a 'blob' marks the object itself in the orthogonal views, so the item currently being edited is known as the 'blobbed' object. When Right Leg, for instance, is the blobbed object, it can be moved or rotated without affecting the rest of the body. One bad point about this system is that when the blobbed object is below another in the tree, the 'parent object' is invisible. For example, if you wanted to draw the foot in place in the ankle slot, you would have to physically measure the position of the ankle in relation to the edge of the monitor, then go down a level and use your measurements to create the foot.

Another criticism of the *Euclid* tree system is that inserting levels between two existing ones doesn't seem to be possible without first saving the model, clearing the memory, creating a new object, saving it, loading the model back in, appending the new object, and finally inserting it in the desired position.

## Input

Each point on each plane or vane has three co-ordinates, x, y and z. By default, y is the vertical axis and z the 'depth' axis, though this is fairly easy to change if you feel z ought to be 'up' (alter a line near the beginning of the *ECdesign* program). Entering co-ordinates can be done by typing in the figures, or by dragging the objects into place with the mouse. The latter method gives only coarse control, and almost immediately we chose the type-in option. In creating Shadow's legs, solid objects such as the pelvic girdle were needed. The only way to build this appeared to be to type in all the co-ordinates three times – once for each of the three planes that meet at the corner of an object.

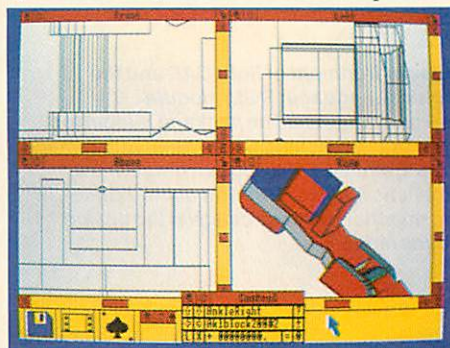
Happily, another method is available, in the form of a separate Basic program. This generates a simple solid, and it was easy to adapt our own shapes. The co-

ordinates are typed in only once, and the colouring is a lot easier. When all the different objects have been defined, the program is run and the shapes are automatically assembled. Then you save them to disc and append them into *ECdesign*. The leg frame was finished much faster using this method. Once in *ECdesign*, the assembled parts could be put together using a sensible hierarchy.

As the leg was gradually built up from the different elements, the display took longer and longer to draw, and by the time the toe positions needed adjusting, it was infuriatingly slow. Even so, it is probably faster than similar applications on other micros.

## Corners and curves

The *Euclid* disc has a number of generator programs like the one for solids. Two were used for creating spheres and cylinders for various parts of



Tree structure for Shadow's legs

the leg. It is not really possible to have a proper cylinder or curve – the computer deals with them as a series of planes. This incurs a big speed penalty. Holes are also impossible – to put a hole in something, you must define the shape with the hole catered for.

That's to say, when telling *Euclid* how many sides a shape has, the sides of the hole must be taken into account. Then the corners can be dragged into the shape of the hole. But you're still left with a 'saw-cut' edge leading from the hole to the side of the shape. If you want a circular hole, this obviously makes things more complicated.

## Displaying

Once you have created a scene, there are a number of ways to display it. You can use the *ECdesign* program and spend some time positioning cameras, using the mouse to rotate and zoom images. This feature was not available on earlier versions of *Euclid*, and the user had to

type in the degrees of rotation and zoom. Now using either Select or Adjust buttons on the mouse makes it much easier. However, it's still not as easy as you would think.

The program applies what must be a very strange algorithm to the mouse interpretations, and there is an unnecessary amount of difficulty in rotating or zooming. Even with practice you won't be able to master it quickly.

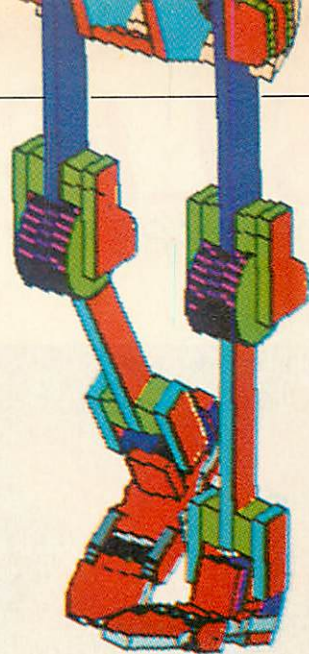
Another method of displaying the scene is to write your own program, accessing commands from the *Euclid* module. But the best way to display the scene is to load it into the *Fly* program. This is a beautiful example of how computers can really help design work – it certainly helped us. Using the mouse and the cursor keys, you can 'fly' around your object, viewing it from any position. And this is the pay off – screen shots are no substitute. It really has to be experienced to be believed!

## Conclusion

There are still a few bugs in the program, which we hope will be cleared up before the Risc OS version arrives. These include inexplicable errors popping up saying 'vane sizes don't match' or such like. But a nice touch built in to *Euclid* is that if a big error occurs, you have the option to save your masterpiece before the computer collapses.

There is no doubt that *Euclid* is helping in the design of the Shadow robot, and by having an exact replica on the screen and taking measurements using the mouse, muscles can be placed wherever they are needed.

*Euclid* does have its faults – most of them in the manual – but overall it is a very smart piece of software. We would certainly recommend it to anyone interested in this field.

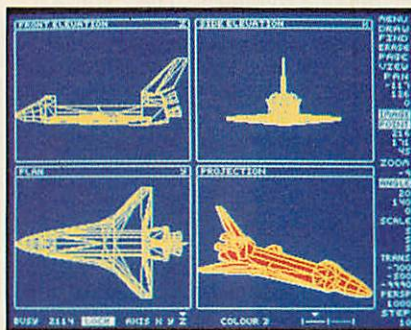
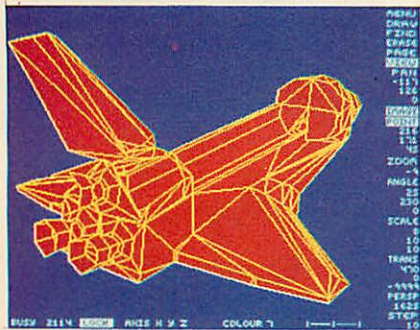




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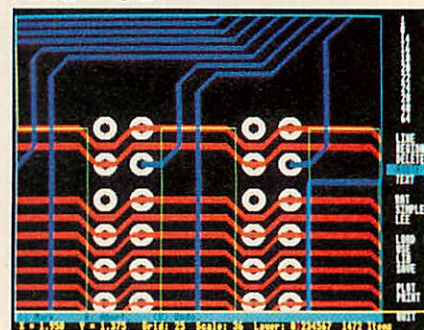
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# REVIEWS

## H A R D W A R E

# CONNECT MORE

**Dr Christopher Dobbing looked at Amstrad's new modem and found it was good but difficult to use with Acorn computers**

The Amstrad SM2400 is a stand-alone version of its highly acclaimed MC2400 modem card for the IBM PC. At £286 it must be the cheapest BAPT approved V22bis (2400/2400 baud) Hayes-compatible modem on the market, and this would seem to make it an attractive proposition for any Acorn users who would like to get more involved in high speed communications.

Unfortunately things are not always what they seem. There are problems using this modem with the model B or Master and Archimedes computers. In fairness the problems are not entirely due to the design of the modem, but they are, nonetheless, important.

The modem is in a slim plastic case designed to fit under a telephone, and has an array of nine red LEDs on the front. With so many indicators it isn't always easy to see exactly what is happening – I would have found it useful for some of the functions to have had different coloured LEDs. It would then be obvious at a glance, for instance, that the modem was on-line with no data carrier detected, without having to check the tiny lettering under each LED.

There are three sockets on the back of the modem; a standard RS232 25-pin D socket, a phone socket to connect a normal phone handset, and a power supply socket. Adequate 'bell tinkle' suppression means that even phones wired in parallel with the modem don't chatter when the modem is pulse dialling – an annoying feature of some much more expensive modems.

The separate power supply is a surprisingly hefty unit, not just a transformer on the back of a plug. The phone cable is three metres long and terminates in a standard BT phone plug. A standard RS232 cable with 25-way D plug and socket is provided, but this will be of no use to Acorn users.

The printed circuit board looks well designed and constructed and the modem does not overheat even if left on con-



**Amstrad SM2400: good value but it takes time and patience to get it to work properly**

stantly in auto-answer mode. There is no reset button. Purists will say this is unnecessary in a smart modem, as resetting is possible under software control. In fact I found it a disadvantage as the modem can 'hang up' and ignore commands until a default period of about one minute has elapsed. All you can do then is wait or power it down and up again, which is much less elegant than pressing a button. An adequate manual gives full details of all the Hayes-type commands that are supported.

There is an internal loudspeaker so that you can monitor the progress of a call. I find this very useful but, if you prefer, it is possible to turn it off under software control.

### Using the modem

In use the modem performed well, and I had no problems with line noise, even at 2400 baud, to bulletin boards where line noise sometimes makes communication virtually impossible. The modem coped

with tone and pulse dialling on direct lines and PABX systems. Inserting a W in the dial string causes the modem to wait for the presence of a second dial tone before proceeding, useful where you have to dial 9 for an outside line.

A serious drawback with this modem is the difficulty it has coping with Prestel-standard (1200/75 baud) operation. The modem can't communicate with the computer at a split baud rate (1200 in and 75 out), and so it is necessary to set your computer serial port to 1200/1200 and then send a command to the modem to buffer the 75 baud data stream. This is explained in the manual and the procedure works well once you've got the hang of it.

Your software may allow you to put the relevant command in your dial string. If you can't, and are a frequent user of Prestel-style systems, you will find this a bit of a chore.

The same problem occurs in auto-answer mode – the modem can adjust



# OFFERS

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# REVIEWS

## HARDWARE

very nimbly to the baud rate of the incoming call if it is V21, V22 or V22bis, but falls over if confronted with an incoming V23 signal. This will pose a big problem for those wishing to operate a multi-baud rate bulletin board.

There may be a way round it, but I couldn't find it – and Amstrad's technical help line was always engaged or unanswered when I tried.

### Connecting up

Now for connecting the modem to your BBC B or Master. Although the SM2400's serial socket only uses eight of the 25 pins, and only six connections are needed to work in most conditions, your computer's serial port only has five lines. You will need to make up a lead as shown in figures 1 and 2. Figure 1 shows the two connecting plugs and sockets. The view in the diagram is of the rear – wiring side – of the plug. You of course get the same view looking into the computer's or modem's socket. The only real problem is that the plug for the BBC micro's serial port can be plugged in two different ways: the best 'fix' is to mark the 'top' of the plug with white paint before you start soldering it together. It doesn't matter which way up it is at that stage, but once you're marked the top, always plug it in with the white mark uppermost.

The modem will still not work unless the Data Terminal Ready pin 20 is maintained high (at 5 volts). There is both a software and a hardware solution to this problem. You can use a Hayes-type command to tell the modem to ignore the DTR line. This works up to a point, but is unsatisfactory in V21 and V23 modes. The alternative is to connect pin 20 permanently to a +5 volts supply. Unfortunately, though many modems provide +5 volts on pin 9 of the RS232 socket for just this purpose, the Amstrad SM2400 does not.

I had to take the +5 volts from pin 1 of the analogue input socket on the computer – a functional but inelegant solution. With this modification the modem worked well with BBC Soft's *Modem Master* software, using the Hayes modem driver. Other V22 modems, for example, the Miracle WS3000, cope

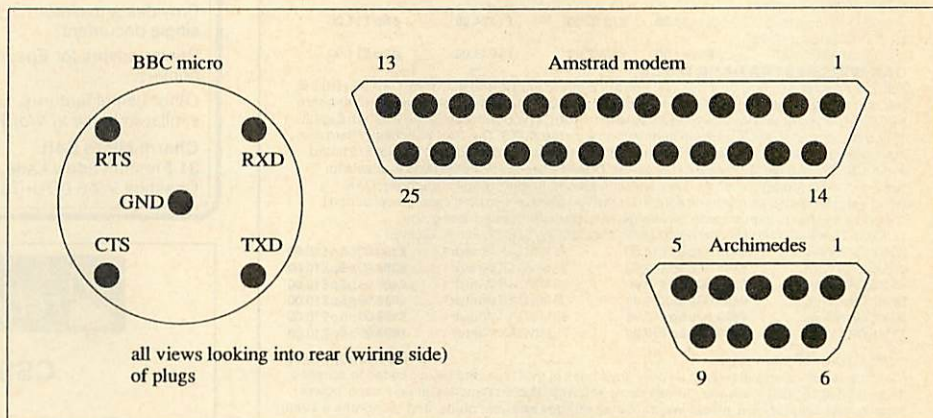


Figure 1: Numbering the connections on the BBC micro, Arc and Amstrad modem

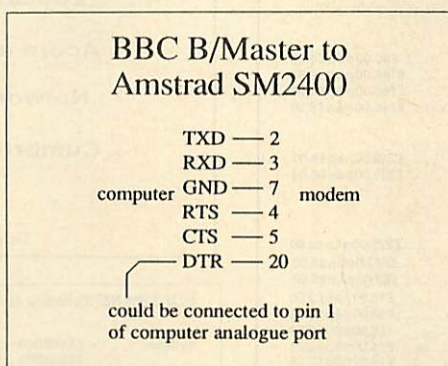


Figure 2: Connecting an Amstrad SM2400 to a BBC model B or Master

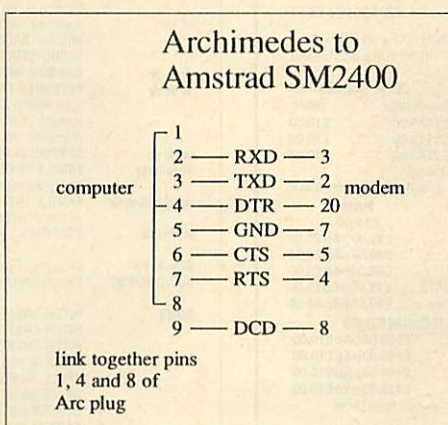


Figure 3: Connecting the Amstrad SM2400 to an Archimedes

easily with split baud rates and do not require a DTR line fiddle.

### Archimedes

In theory, Archimedes users have no problems, since the specification includes a standard IBM-type serial port. In practice, however, there are difficulties. Firstly the port is a nine-pin 'D' connector as found in the IBM PC-AT, not a 25-pin connector as on the PC, so the RS232 cable supplied with the

modem is no use. Secondly, in early versions of the Arthur operating system the serial port was not adequately supported and a patch which can be obtained from Acorn Customer Services – (the address is in the Customer Hotline column on page 10) is necessary. This has been corrected in Risc OS. Thirdly the pins are not wired as they are on the PC-AT. This appears to be because the Archimedes serial chip handles the CTS and DCD lines in different ways. A bug in the chip itself means that it cannot be made to work correctly.

Figure 3 shows details of how several authors of Archimedes terminal software have agreed to standardise on the wiring of the serial port. This includes Beebug, author of *Hearsay*, and BBC Soft, which is writing *ArcComm*. Note the extra link between pins 1, 4 and 8.

Using this arrangement and an advance copy of BBC Soft's *ArcComm*, I experienced no difficulties with the modem except for the split baud rate problems in V23 mode.

### Value for money

It must be said that the Amstrad SM2400 modem represents remarkable value for money when compared with other modems of a similar specification, and must be the best buy for most computer users. BBC B, Master and Archimedes owners will not be able to just plug in and get on-line, although with a little care and patience I found the modem could be made to operate perfectly well.

*Amstrad SM2400 modem; £286; Amstrad Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF.*



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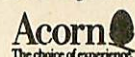
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# REVIEWS

## SOFTWARE

# RECORD KEEPER

Dave Lawrence examines the latest in file managing systems  
— and finds that it could be better and cheaper

Pres's *Advanced File Manager (AFM)* is another in the ever-widening range of disc utility ROMs. It does, however, have a few very nice features for the £29 it costs. At its simplest level, *AFM* is simply a front-end to the standard filing system. It works equally well with DFS and ADFS, although it is really more suited to the hierarchical nature of the latter. *AFM* will work in any machine from Electron to Compact. Unfortunately it does not work with a network: this would have been a boon, especially when using the 'Copy' function.

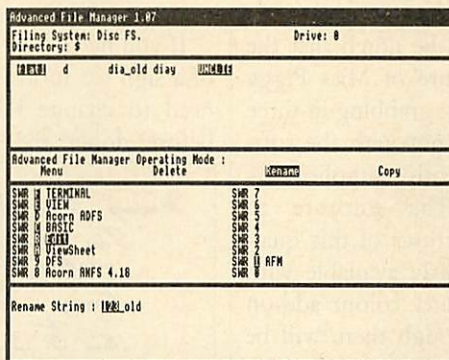
The manual contains instructions for each machine on where best to plug the ROM in. Once safely installed, the \*Afm command will start the system. If you really want you can even configure your Master to automatically enter *AFM* when you press Break.

Once started, the screen changes to mode 0 and five boxes are drawn down the screen. On a Master, the outside of these boxes is then flood-filled. This takes an age, and really gets annoying. You can press Escape to stop it. But why not just draw the boxes and background a quicker way?

These boxes contain (from top to bottom) the current filing system, drive number and full directory, a list of the files in the current directory, the four available *AFM* modes, a list of the sideways ROM and RAM images in your machine and last but not least, the current 'rename string'.

The cursor can be moved within these windows with either the cursor or 'Snapper' keys (ZX:/). In general, Return is used to select items. You move between the windows by pressing Space. I found this horribly fiddly: if you 'overshoot' the window you are trying to get to, you need to go through them all again. This system is at its worst when trying to change mode, as it can take at least four keystrokes to enter a new mode — a short cut system, maybe using the function keys, would help.

Escape is used to return from acciden-



AFM: easy to learn but low on 'extras'

tally selected commands, but it is also used to exit the system — so don't hold down Escape for too long, especially when aborting the flood-fill!

*AFM* has four modes of operation. Menu allows you to wander about a disc, entering directories and loading files. The current file is highlighted with a '>' for an ordinary file and a '\*' for a directory. But unless a file is the current, highlighted one, you can't tell files and directories apart. The outcome of selecting a file depends on which sideways ROM or RAM is currently selected. With Basic you are presented with CHAIN, LOAD and a smattering of \* commands. If you have *View*, then you can LOAD, READ, PRINT and so on. This is perhaps one of the nicer features of the ROM — you can even extend the system, with an Oswald call, so *AFM* 'knows' about other loading procedures. It already has information about *ViewSheet*, *ViewSpell*, *ViewStore*, *Wordwise*, *Wordwise Plus*, *InterWord*, the Basic Editor and *Edit*.

One 'quirk' is that once a command is executed in this way, you are returned to Basic or the selected language, so commands like \*Type and \*Dump are not particularly useful — you must re-enter the system with \*Afm again. At least you are left in the same directory. There is also no \*Info command.

Delete mode is used to delete files. The files must first be 'marked' in the file window with Return. Delete marks whole directories. Copy will then delete

the marked files. Dangerous, because all the 'active' keys are a trifle close together. Deleting isn't recursive, so you must clear out directories before deleting.

The Rename option is used to rename files. It has a, perhaps, unique feature which is a wildcarded rename. You first select the file in the file window, you then enter a 'rename string' in the bottom window. This can contain ordinary Ascii characters, the '\*' meaning the file's old name, and CTRL 1 to CTRL 9 which mean the first, second...etc. letters of the old name. So CTRL 1, CTRL 2, CTRL 3, 'Old' would rename the file with the first three characters of the old name plus 'old' tacked on the end, and the same for other selected files.

Finally, the Copy option is a comprehensive file copying system that will deal with different directories, drives and even filing systems. As usual you select the files and directories to copy from the file window, and then press Copy. It prompts for disc changes as and when necessary. It uses as much memory as it can find, including any Sideways RAM, Shadow RAM and the Tube if present plus Pres's own add-ons.

One added feature is that it will split large files across more than one disc if they won't fit. This enables large files on Winchester to be backed up onto floppies. Unfortunately, you have to remember which files are split in this way so they can be reconstructed. This feature does reveal one rather nasty omission — there is no formatter and more importantly no method of entering ordinary \* commands. *AFM* does have a built in link to Pres's Control Panel drip to alleviate this — but £60 for the combination of ROMs is too steep.

I found *AFM* easy to learn but there aren't enough 'extras'. The load mechanism and the rename and copy option are good — perhaps with more time taken over the user interface, a formatter built in, compatibility with network and a lower price, *AFM* would be worth it. It's good, but not that good.



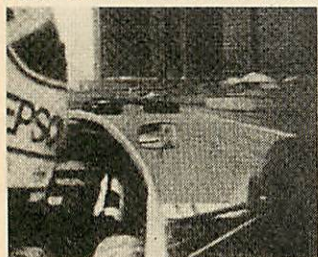
# LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TNS 81:RED001

## DIGITAL DESIGN

Sir, As designer of the Watford Arc Digitiser, I feel I must correct some inaccuracies and answer some of the criticisms made in the review in the January issue of *BBC Acorn User*.

The reason that a board-mounted BNC connector was not used is that BNC plugs can be rather tight, and so repeated connection and disconnection would put a lot of stress on the board. Although you can get connectors which PCB mount and fix to a panel this would not allow the rear panel position to be adjusted, as is necessary on some Archimedes machines. So the panel-mounted connector used is the best bet. I



The digitiser in action

agree the rear panel metalwork is not wholly satisfactory, and this is being changed to the more traditional design.

Sprites may be generated for 2, 16 and 256 colour modes, not just mode 12 as stated in the review.

I'm currently updating the digitiser software to cope with the new screen modes in Risc OS, and I hope to have this update included on the support disc which will be supplied with the Risc OS upgrade.

It should be noted that the colour picture of Miss Piggy was done by grabbing in three passes, but not with the software currently supplied by Watford. The software to produce pictures of this quality is currently available with the Linguinity colour add-on board, although there will be a separate version for use with mono cameras and filters.

Mike Harrison  
London

The source of the Miss Piggy picture was omitted from the caption in error.

## FANCY FONTS

Sir, I read with interest Kevin Kealy's comments on Wight Scientific's *Signwriter* program in the December issue of *Acorn User*, and feel like adding some of my own. I have been using this package for about a year. There were a few problems originally, but Wight Scientific was quick to sort them out.

I enclose a notice that I prepared for the handicrafts class of which I am a member. It had to be done in three separate goes, as you can't change fonts during printing.

One thing which was not mentioned in the review was that you can load a sign into a wordprocessor and do a little editing there. It is then quite easy to adjust the line spacing and so on. But if you want to replace one letter with another take care, as the letter spacing is always proportional.

If you need to keep the text of a sign for future use, you'll need to change the filename before doing the next sign.

*Wishing You Happiness  
This Christmas  
and throughout the  
Coming Year  
from  
Muriel B. Dearlove*

Miss Dearlove's card

Each one is saved as 'Sign', so that any further sign saved on disc overwrites its predecessor.

In spite of its slowness, I think this program is quite excellent; I have not seen another as good.

And it comes up black, too, even when using a well worn printer ribbon.

MB Dearlove  
Chessington

Muriel Dearlove's pretty Christmas card to *BBC Acorn User* was printed using *Signwriter* and the colour printing techniques she described in August 1988's *Acorn User*.

## SON OF PRISC

Sir, Like many of your correspondents, I found the *PrtSc* utility very useful when using *ViewStore*. The modification in response to Mr Duncan's letter resolved one problem and I especially welcomed the further modifications in the December issue.

But when I use the utility with the December additions

on my Master, there seems to be the original problem of an omitted space after a string printed in inverse video.

Is there a further bug or have I got something wrong?

Dr RSF Harding  
West Yorkshire

```
390 LDX #2
delete lines 500-640

500 CPY #6AB
510 BNE exit

670 PLA
680 LDY #0
690 PHA

1080 BMI loop0
1081 BNE loop2
1082 .loop0
1083 LDY #3
1084 JSR rvstest
1085 LDA #135
1086 JSR osbyte
1087 TXA
1088 PHA
1089 LDY #7
1090 JSR rvstest
1091 PLA
1092 BMI loop1
1093 BNE loop2
1094 .loop1
1095 LDA #32
1100 .loop2

1601 :
1602 .rvstest
1603 LDX #4
1604 .rvsloop
1605 LDA rvsdata,Y
1606 JSR oswrch
```

The amendments in the box above are the definitive changes for *PrtSc*. Add these lines to the version of the program printed in August 1988's *Acorn User*.

It combines the ability to print inverse video and deal properly with spaces. Plus it now works on the Compact with *ViewStore* too. For the technical reader, it uses a different event from the original - number 2, character entering input buffer - to check when your press CTRL-Copy.



## FASTER MASTER

Sir, I read with interest your article published in the December 1988 issue of *Acorn User* on printing high resolution mode 0 screen dumps. This program was excellent, but was quite slow when printing out because of the need to load and reload each of the two screens. Indeed, if anybody did, as you suggested, write a program using more than two screens, it would take a very long time.

I have a BBC Master and as this program used only two screens, I decided to use Shadow RAM to store each one. There are only a few alterations to the program:

```
370 IF GrOff% < > 0 THEN
MODE 128:HIMEM=
&3000
```

DELETE lines 380,390

```
1440 *FX 108,1
1445 *FX 113,2
1510 *FX 108,0
1515 *FX 113,1
```

This improves the program greatly. The FX 108 and 113 commands, along with the FX 112, control the use of Shadow RAM and are very useful if you are using two screens for animation. FX 108 switches either the shadow or main memory into the memory map immediately. FX 113 affects whether shadow or main memory is displayed on screen and FX 112 decides which memory is written to. You could use FX 112 to write to shadow memory, but have main memory displayed, so nothing you type would appear on screen!

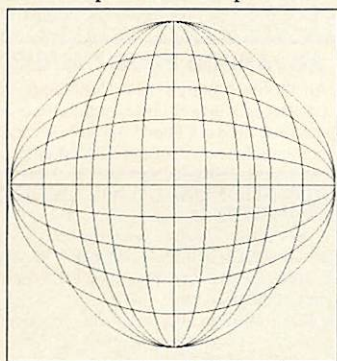
While on the subject of spooled files, if you are printing several copies of the same

screen, an easy way to speed this up is to do something like this:

```
*SPOOL xxx
*SDUMP
(screen dump command)
*SPOOL
*PRINT xxx
*PRINT xxx
```

and so on.

During the first dump, all the output to the printer is



640 x 512 screen dump

also sent to the file 'xxx'. On subsequent dumps, this data is loaded in from disc, therefore avoiding repeatedly calculating the data needed to send to the printer. But it does create a gigantic file though.

I have also read your January 1989 issue, and welcome your commitment to the humble Electron, BBC B/B+ and Master!

AW Cumming  
Co Durham

The amendment certainly speeds up Michael Geller's high-resolution screen dump if you have a Master.

## HOT STUFF

Sir, I would be very grateful for the answers to a number of questions.

I own a Master with co-pro adaptor and a 512 unit. I originally had the second processor inside the Master, but

overheating problems forced me to add the adaptor. Unfortunately, the adaptor has a very short lead. Can I extend it somehow?

In general I have been very pleased with the 512 unit. Despite popular belief it seems to run most programs, but it does have one serious drawback. Discs formatted using the 'DISK' utility cannot be read by other MS-DOS machines. I do not particularly care why this should be so, but since this is the facility that makes MS-DOS worth bothering with at all, I would indeed be grateful for a solution to the problem.

I notice an advertisement in your magazine for a DOS+ problem solver. Do you intend to review this product?

K V Kirk  
Reading



PC clones prefer 360k format

All second processors must have a relatively short lead – because of interference and capacitance problems that get worse as the lead is extended. The lead should only be long enough for the co-pro adaptor to sit neatly to the right of the keyboard.

The commonest disc format for PC systems is the 360k format, for which the DISK utility offers an option. Most PCs cannot read the DOS-Plus 800k format. We are looking at Shibumi Software's problem solver.

## TELETEXT TROUBLES

Sir, I have been using a BBC B for about three years at home as well as at my office. I like the system; in fact, *View* and *ViewSheet* have become the basis of my administration. The BBC is still comparatively rare in Belgium, which makes communication with other users difficult. Still, *BBC Acorn User* seems to solve this by bringing together ideas of people with similar interests.

I bought a GIS teletext adapter, but have never been able to get it working in Ghent. To my surprise, I cannot scan BBC 1 or 2 and not even any Belgian programs, even though reception of television programs is good.

The ability to download telesoftware was the sole purpose of purchasing the adapter. Please could you offer some advice?

Prof Dr DL Clement  
Ghent  
Belgium

In Belgium and Holland, BBC 1 and 2 are sometimes available on cable TV systems. But there are two problems. First, the cable operators may strip off the teletext signals, leaving just the TV program signals to go to your house. So there may be no CEEFAX there to pick up. And some cable systems work on VHF rather than UHF: the adapter can't be tuned to VHF stations so it can't pick up the signals. The only way it will work is with an external UHF aerial picking up signals from Britain, and then the signal may be too weak for good CEEFAX reception.





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Advanced File Manager 1.04 (C) PRES 1980.

Source: Advanced Disc FS.:0.\$,Software:AFM.afm104

Letter102	AFMexp	App	APPS	ASM	changed	changes
PRIL	Letter103	Letter104	manualla	manuallib	manuall2	manuallch
PRIL	PRILB	PRILM	PRSRAM	S	S1	S2
SD	SDC	SDINFO	SPEEDY	Z	ZG	ZH
2Pprint	2P2G	2P2H				

Target: Advanced Disc FS.:1.\$,AFMarchive

AFM	ASM	s1	s2	s3	s4	s5
s6	s7	s8	s9			

(C)change : Off (F)ollow : Off (O)ver : On 658951 bytes free 10 marked  
s6 noted for copying to Advanced Disc FS.:1.\$,AFMarchive  
s7 noted for copying to Advanced Disc FS.:1.\$,AFMarchive  
s8 noted for copying to Advanced Disc FS.:1.\$,AFMarchive  
s9 noted for copying to Advanced Disc FS.:1.\$,AFMarchive

Screen picture shows AFM in Copy mode on Master Turbo

AFM follows the PRES 'Master Plan' of upwards compatibility - it runs on Electron, BBC B, B+, B+128, Master 128 and Compact, with Second/Co-processors and Acorn-compatible versions of DFS & ADFS.

## AFM has four distinct modes:

**MENU** - allows browsing through the files and directories on a disc. Files are started from a menu of up to 7 options chosen for a selected ROM. Loaders are provided for Basic, The Basic Editor, View, ViewSheet, ViewStore, ViewSpell, Edit, Wordwise (+) and InterWord. This list can be expanded infinitely using an Acorn-approved OSWORD call ... full details and example in the manual.

**DELETE** - allows files to be marked and then deleted with one keystroke.

**RENAME** - allows one or more files to be marked and then renamed using a wildcarded name, ie one which varies with each file renamed. Thus you could rename s1, s2 and s3 to be s1\_old, s2\_old, and s3\_old in one operation. ... and that's only the beginning! As well as using the whole of the original name you can also pick out individual characters to form part of the new name.

**COPY** - the strongest feature of AFM. It is a two stage copy routine. With both source and target directories shown on screen the files to be copied are marked. Once all the files have been marked copying is started and the computer can be left to get on with it!

Large files can be split across several disks, and recombined.

As much as possible of the computer's memory is used for copying files, including unused parts of shadow screen memory, sideways ram banks (inc. AP7), ram cartridges (inc. ABR (32K) and AQR (256K)), tube memory (up to 61K), B+ paged ram (12K) and unused parts of the Slogger Master Ramboard (Electron).

Comprehensive error trapping and recovery is provided, so a copying run will rarely have to be aborted unfinished! And there's much, much more.



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All this without dramatically increasing the required desk space! Now well into the SECOND THOUSAND production. Remember - 2nd drives (3.5 or 5.25) can be added and the AP3 drive can be used on a BBC or Master computer! Also most Electron disc-based software is supplied on 3.5 ADFS discs. The only fully compatible disc upgrade running Acorn's own preferred filing system (supplied on: Plus 3, Master 128, Master Compact and now the Archimedes)

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- 5) \* KILL - totally disables the Plus 1.
- 6) \* LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) \* LROMS - locks all sideways RAM banks found.
- 8) \* UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) \* UROMS - to unlock all sideways RAM banks found.
- 10) \* SAVEROM - saves a ROM image to current filing system.
- 11) \* LOADROM - loads a ROM image from current FS into a RAM bank.
- 12) \* FORMAT - will format an ADFS disc for Plus 3 or AP3.
- 13) \* VERIFY - tests every sector on an ADFS disc.
- 14) \* VFORM - formats and verifies an ADFS disc in one command.
- 15) \* BUILD - creates a text file that can be used by \*EXEC (ie !BOOT).
- 16) \* LIST - displays a numbered listing of a text file.
- 17) \* TYPE - displays a file on screen with no line numbers.
- 18) \* DUMP - to view a file's contents on screen.
- 19) \* LANG - selects a default language to be booted on (CTRL-BREAK).
- 20) \* HELP - provides a full 'help' list on all the ROM's commands.
- 21) \* AQRPAGE - selects specified page in AQR.

Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a !BOOT file or lock/unlock/Load a ROM image into ABR PLUS much more... the ideal companion from the company that produces the Acorn Plus 1.

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The AP2 is the definitive Plus1 ROM... I'm not sure what I'd do without it... like all of PRES's other products, it's been well worth waiting for!"

July '88

## FILING SYSTEMS

### ADFS VERSION 1.1

Suitable for existing Plus 3 or A.P. 4 users. This new version has the software fixes for Zysyshep, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorn's adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.

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**AP3 INTERFACE:** As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket.

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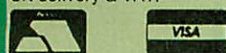
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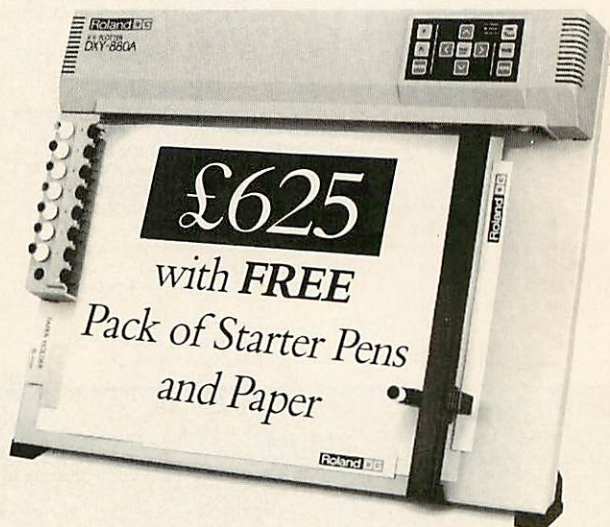
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BBC ACORN USER MARCH 1989



# FREE ADS

**Wanted** Penfriend aged 13-16 with BBC Master and 3.5-inch disc drive. Contact: Graham Wharton, 1 Highfield Close, Eaglescliffe, Cleveland.

**Penfriend** wanted with BBC Compact, disc drive. Contact Mohon Ali, 276 Staniforth Road, Sheffield, S9 3FT.

**Penpals** Archimedes user in Greece. Hints, tips, etc. Stelios Kontozoglou, 31 AG. Paraskevis, Str 145 61, Vifisia, Athens, Greece.

**Watford** 3.5-inch new disc drive for BBC O/S 80T. Unwanted part of package deal, £50. Tel: Derby (0332) 812138.

**Bitstik** for model B, 6502 second processor. Hi-Basic, DNFS, ROMs, Bitstik multi-plotter driver, £200. Tel: (0705) 599158 (South Hants).

**BBC B** issue 7 Acom DFS Z80 Torch pack. *Perfect & Wordstar*, twin drives, high resolution monitor. Offers? Tel: 01-940 3985.

**BBC B** DFS APTL sideways ROM board. Single DS/DD, lotsa software, Digimouse, £375. Tel: Luton (0582) 580680. Consider exchange Atari 1040ST.

**BBC B** (8271) DFS for sale, as new. Manuals, boxed, plus cassette and TV monitor, £220. Tel: (0255) 429883.

**Archimedes** A310 IMB RAM 20Mb hard disc. Lots of software, games, PC emulator, printer, manuals. As new, £1,500 ono. Tel: Leon 01-466 5447 (eves).

**BBC B**, Opus DDOS, leads, software and manuals. Excellent condition, £220 ono. Tel: 01-441 1019.

**Master** Compact, TV modulator. Dump ROM, great condition, £225 ono. Tel: David 01-428 3581 (eves).

**32k** shadow board from Watford Electronics, £35. RAMamp 32k sideways RAM board. Six ROMs, lots of software, £20. Tel: (0767) 315443.

**Archimedes** 305 entry, hardly used. Plus £40 of books, £580 ono. Write to: D Lau, 35 Paddockhall Road, Haywards Heath, Sussex.

**Master** 128 PC case. Two drives, monitor, teletext (ATS), *InterWord*, *Spellmaster*, two cartridges. ROMs, software, books, leads, etc. £550. Tel: (04575) 67321 (Manchester).

**Microvitec** standard resolution monitor, £140 ono. ROMboard for Master, £20 ono. Exmon ROM, £10. Z80 books, Zaks & Leventhal. Tel: (0458) 250130.

**BBC B** issue 7, 40/80T disc drive. Multiprom EPROM programmer for all 28-pin EPROMs. Uvipep EPROM eraser and software. All £320. Tel: 041-641 1200 (Glasgow).

**BBC B** ROMboard, dual disc drives. Much software, ROMs, £345. Tandy 100 lap-held disc, video unit, modem, software, £245. Tel: (0865) 863333.

**Monitor** 14-inch colour, RGB comp video sound, medium res, £100. Printer Smith Corona D100, £90. Both excellent condition. Tel: (04243) 4500, E Sussex.

**Bargain** BBC model B printer & disc drive, £100. Discs, mint condition, £500. Also wanted: Quattro modem. Tel: (0905) 53248.

**Electron** 64k Plus 1, Plus 3, AP5, AP6 ABR RS232 port. *View*, *ViewSpell*, *Starword*, *Starstore*. All manuals, £230. Tel: (0703) 770464.

**Brother** HR 25 XL printer. Spare ribbon, superb quality print. Hardly used. Cost £600, accept £300 ono. Tel: 01-789 3004.

**Two** 6264LP chips, for sideways RAM-boards, 8k each, as new, £12 the pair. Tel: (0799) 40649.

**BBC B** 1.20 OS cassette recorder. Games, (including *Elite*), manual, book, excellent condition, bargain £220. Tel: 01-881 6912 (eves).

**ACP** battery backed 32k RAM cartridge,

£20. Joystick, £7. *Elbug* magazines, books. Tel: 051-342 6472.

**Philips** 22 meg amber monitor, as new, £50 ono. Tel: Reading 581549.

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**BBC B** issue 7, Canon drive ROM/RAM-board. Dozens ROMs, mags, discs, tapes, advanced books, print-outs. Hundreds of games, joystick, £350. Tel: (0626) 55262.

**BBC B** issue 7 + DFS dual DS40/80T drives. Viglen PCU, 65022P. Music 500, modem 2000, loadsa ROMs. Books, discs, £675 ono. Tel: Southend (0702) 330815.

**Must** sell my Master 512 to buy an Archimedes, £650 (including many extras) + disc drive. Tel: Michael 01-989 0408.

**Drive** metal cased 3.5-inch + PSU Cumana 5580T. Games, instructions, ROM images, software, discs + userdump ROM, £98. Tel: (0284) 753177 (eves).

**BBC B** issue 7, DDFS cassette recorder. Extras, £290. Disc, games, *Shark*,

*Codenamed Droid*, *Elixir* (5.25-inch), £5 each. Tel: (0482) 801018.

**Acorn** Z80 second processor. CPM2.2 bundled software, £125ono. Torch Z80, perfect software, £100ono. Tel: (0203) 225053.

**Archimedes** A310, colour, plus loads of software. Reference manuals, £950 ono. Tel: Keith (0705) 690416 (eves).

**Cannibalise** my old model B! Write for a list of parts and prices to: Andrew Moulden, 45D Kelvinhaugh Street, Glasgow, G3 8PE.

**Master** 128, £250. 40T disc drive, £50. ROMs, mouse, etc, also available. Tel: (0245) 321285.

**Wanted** BBC B, DFS and *View* or BBC Master 128, preferably with disc drive, monitor and printer. Tel: (0245) 466078.

**Wanted:** Acorn Cambridge work station. Tel: (0242) 572174 (eves).

**Wanted** BBC model B micro. Must be in working order. Tel: Hugo (0745) 825036 anytime.

**Wanted** Marconi Trackerball for BBC B or Master, software, etc. Tel: Sheffield (0742) 368198.

**Wanted** 8271 chip and ROMs or software, excluding games for BBC B. Tel: 091-528 8802.

**Wanted** BBC Master 128. 40T 5.25-inch disc drive, medium or high resolution monitor. Tel: R Edwards (0793) 721673.

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# ACORN USER'S

DIARY

## Fuss about nothing

Ace reporter Orson Fact has to hand it to the chaps at *C&D Compacting*. They lose the disc drive and processor from their Arc and when Acorn refuses to give them a new one, decide that it must be the shape of things to come. So, unlike Orson and his friends, who have plenty of real news to report to their readers, *C&D* splashes it all over the February cover.

Orson and photographer Holly de Snappe themselves are not averse to hiding in waste bins for stories. It's just what they were told to do in the Ladybird 'How to be a cub reporter' book they read. But Orson suggests that stories found in rubbish bins, as Clive 'Dis' Grace claims his was, are often just that – simply rubbish.

Michael Page, Acorn's publicity supremo, agreed. 'It sounds like a load of rubbish to me, he said, when Orson asked him to comment on *C&D Nimcomputing*.

If you're thinking of buying an Archimedes 205, you'll have a long wait. And if you want to imagine a specification for phantom new Archimedes



Note the paper-white monitor, cassette port and integral phone

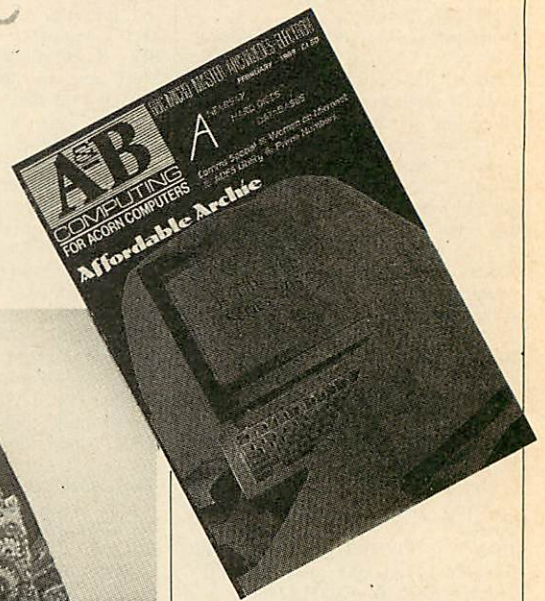
models, check the DES guidelines on computer hardware for schools – they are much more detailed than anything *C&D* found in its bin. When something really does happen, Orson will tell you first.

Another interesting revelation from the games pages of *C&D Confused* is the rumour of a new Superior game called *Zorbicos*. Dave 'Late' Reader should get the hair out of his ears. In fact, it was going to

be a joint venture with Cadbury's, manufacturers of Milk Tray chocolates. And the game would have been called *And all Because*. But it isn't happening now anyway.

And finally, contrary to the *C&D* news, the existing *PipeDream* does work with Risc OS – all they had to do was try it out.

It all goes to show, you can't believe all you read in the Argus Press.



## Abuse in brief

■ In the interests of balance, Orson has been racking his brains trying to think of something nasty to say about *The Micro User*. But all he can think of is how late they are reviewing *First Word Plus*.

And it is good to see the staff there do read *BBC Acorn User* – after *BAU* showed the world how to take a good screen shot, they manage to under-expose their only picture of Risc OS.

■ Gem Electronics publishes a game called *Word-up, Word-down*. It may, or may not, be a winner. We can't tell. Despite all efforts in the office, we couldn't get it to run. The strange thing is that the 'hidden' bonus game (which is to save the leaping yuppies), still works fine.

■ Star Micronics almost merits a Tony award this month. Receiving a package in the post, we were pleased to see its latest new printer was packed with a super free gift – a helium balloon. Great fun. But Star failed to win a Tony because there was no printer. It had mailed us a balloon in a box – to publicise its sponsorship of a forthcoming aeronautical event.

## Who do you know in Cambridge?

At least four software writers\* are putting together a *Hypertext* system for the Archimedes. *Hypertext* is a way of cross-referencing information, so if you want further details on something, you just click on it with the mouse. This brings up the details, or leads to other related items –

perhaps a picture to explain a difficult concept.

But if you are trying to interest software houses in your program, and it's only one of three, what's the best way of standing out from the herd? One bright idea is to create an example bit of *Hypertext* – perhaps one of

the 'Cambridge phenomenon' (all the whizz-kids and the mass of new hi-tech companies that have set up in the area). And this way, everyone you are trying to sell it to is actually in the story (and given the rapid job swaps in Cambridge, probably several times)! Brilliant.



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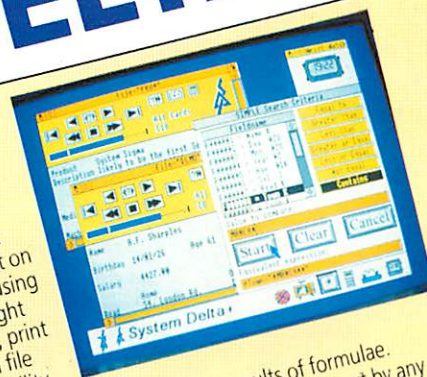
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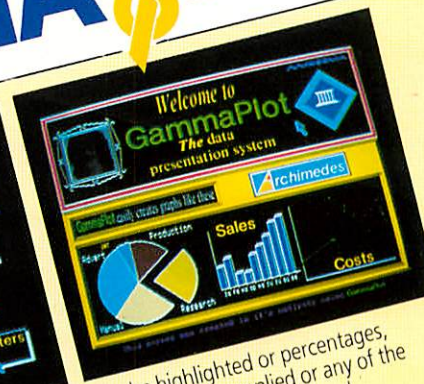
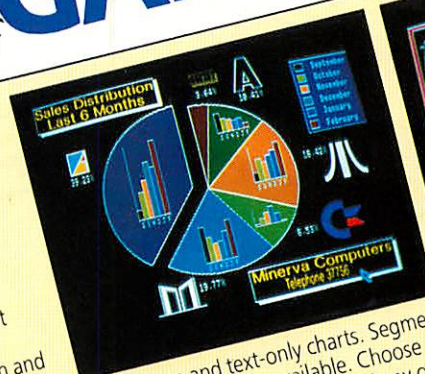
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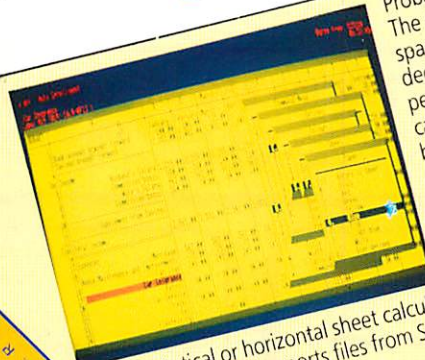
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## SNAPPER

**SNAPPER**  
Acornsoft's Arcade Classic  
"Snapper is an excellent  
reproduction of the popular  
arcade game. Acornsoft have  
really excelled themselves yet  
again with Snapper. The maze  
is clear and the fruit are all very  
realistic. Summary: Totally  
excellent, classic game.  
Brilliant!... A & B Computing



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## GHOULS

**GHOULS**  
Micro Power's Ghostly Hit  
"Ghouls is a delightful game set  
in a mansion on top of a  
creepy hill. The graphic quality  
of Ghouls is impressive. The  
sound in Ghouls is superb.  
Some of the noises are creepy,  
and would be well-placed in a  
horror film! Ghouls is a great  
game. ...Acorn User



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